DOCUMENT RESUME

ED 354 906 IR 054 490

AUTHOR Dillon, Martin; And Others
TITLE Assessing Information on the Internet: Toward Providing Library Services for Computer-Mediated Communication. A Final Report.
INSTITUTION OCLC Online Computer Library Center, Inc., Dublin, Ohio.
SPONS AGENCY Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE 93
CONTRACT E-R039A10007
NOTE 166p.
PUB TYPE Reports - Descriptive (141)

EDRS PRICE MF01/PC07 Plus Postage.
DESCRIPTORS *Computer Networks; Electronic Mail; *Electronic Publishing; Information Dissemination; *Information Networks; Information Storage; Integrated Library Systems; *Machine Readable Cataloging; Online Systems; Tables (Data); Users (Information)
IDENTIFIERS *File Transfer Protocol; *Internet; MARC

ABSTRACT

The Online Computer Library Center Internet Resource project focused on the nature of electronic textual information available through remote access using the Internet and the problems associated with creating machine-readable cataloging (MARC) records for these objects using current USMARC format for computer files and "Anglo-American Cataloguing Rules, Second Edition" (AACR2). Internet users gain access to files using the File Transfer Protocol (FTP) and the Simple Mail Transfer Protocol (electronic mail). During the time of this study, the number of FTP sites increased 25%; the number of files, 46%; and the amount of storage, 63%. Descriptive information associated with these files is scant. Source code and system code combined account for 43% of files and 49% of storage, while text files account for 10% of files and 8% of storage; other categories include news, personal computer programs, data files, computer images, computer games, and executable program files. A test of the USMARC format for computer files and the AACR2 rules revealed that some extensions are necessary to accommodate remotely accessed electronic objects. A new MARC field, electronic location and access, is proposed. Draft cataloging guidelines to assist in the application of existing rules are offered. Twelve figures and 18 tables present study findings. Five appendixes include additional information about Internet and a 410-item annotated bibliography. (SLD)

**********
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
**********

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

ED354906

# Assessing Information on the Internet

## Toward Providing Library Services for Computer-Mediated Communication

A Final Report to the

U.S. Department of Education
Office of Educational Research and Improvement
Library Programs

by

Martin Dillon
Erik Jul
Mark Burge
Carol Hickey

January 31, 1992

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
L. Yoakam

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

IR054490

## Acknowledgments

The OCLC Office of Research gratefully acknowledges the support of the U.S. Department of Education, Office of Educational Research and Improvement, Library Programs, and the contributions of the following, without whose help this project would not have been possible: Glee Cady, Pricilla Caplan, Rebecca Guenther, William W. Jones, Jr., Diane Kovacs, Ann Okerson, Nancy B. Olson, Peggy Seiden.

Special thanks Peter Deutsch and Alan Emtage, for providing access to the archie listings database, and to the many volunteer participants in the experimental cataloging portion of this project.

Copyright 1993 OCLC Online Computer Library Center, Inc.

Printed in the United States

## Contents


Part I, General Data ..... 1

Part II, Narrative ..... 3

Abstract ..... 3

Introduction ..... 4

Objectives ..... 4

Methods ..... 4

- Reference Sources ..... 5
- Information Map ..... 5
- Document Collection ..... 9
- Preliminary Analysis ..... 11

Analysis of FTP Sites ..... 11

- Method ..... 12
- File Collection and Analysis ..... 12
- Directories, Paths, and File Names ..... 16
- Readme and Index Files ..... 17
- Types of Files at FTP Sites ..... 19
- Summary Analyses ..... 22
- Performance Analysis ..... 25

Cataloging Experiment ..... 27

Hypotheses ..... 27

Methods ..... 27

Requirements for Participation ..... 28

Experimental Procedures ..... 29

Experimental Results ..... 31

Analysis ..... 31

Interpretation of Scores ..... 35

Fixed Fields ..... 35

Variable Fields—Authors and Titles ..... 35

Notes Fields ..... 36

Location and Access ..... 36

Recommendations ..... 37

Notes ..... 40

Appendix A, Proposal 93–4 ..... A:1

Appendix B, Guidelines for Bibliographic Description of Internet Resources ..... B:1

Appendix C, Data Dictionary and Regular Expressions ..... C:1

Appendix D, Guidelines for Participants ..... D:1

Appendix E, The Internet and the NREN: A Bibliography ..... E:1

## Part I

### General Data

**Institution Name:** OCLC Online Computer Library Center, Inc.
6565 Frantz Road
Dublin OH 43017-3395

**Project Director:** Martin Dillon, Director, Office of Research
(614) 764-4365

**Report Prepared by:** Erik Jul, Communications Manager, Office of Research
(614) 764-4364

**Grant Number:** E-R039A10007

**Project Period:** October 1, 1992–September 30, 1992

**Grant Award:** $48,675

**Actual Expenditures** $53,958

## Part II

## Narrative

### Abstract

The OCLC Internet Resource project focused on two areas of inquiry: (1) investigating the nature of electronic textual information available through remote access using the Internet, and (2) investigating the practical and theoretical problems associated with creating machine-readable cataloging (MARC) records for these objects using current USMARC format for computer files and *Anglo-American Cataloguing Rules*, 2d. ed., revised.

Internet users gain access to text files and other electronic objects using the TCP/IP protocols: File Transfer Protocol (FTP), Telnet (remote login), and Simple Mail Transfer Protocol (electronic mail). At the time of this study, more than three million files representing 165 Gbytes of data were available from 1,044 FTP sites. The 20 largest FTP archives account for 57% of available files and 38% of the storage. During the period of study, the number of sites increased 25%; the number of files, 46%; and the amount of storage, 63%. Descriptive information associated with these FTP files is scant. On average, fewer than three (2.47) directory/file names describe any given file. For ancillary informational files such as "readme" or "index" files, on average, one readme file exists for every 3.5 directories and one index file for every seven directories.

An automated categorization of all files at 1,044 sites revealed that source code and system code combined account for 43% of files and 49% of storage. Text files account for 10% of files and 8% of storage. Other statistically significant categories include news (text archives originating from Usenet newsgroups), PC programs, data files, computer images, computer games, and executable program files.

A test of the USMARC format for computer files and *AACR2* cataloging rules revealed that some extensions are necessary to accommodate remotely accessed electronic objects. Most notably, a method or methods of communicating location and access information are required. A new MARC field, Electronic location and access, an addition to the USMARC format for holdings and locations, is proposed. Draft cataloging guidelines to assist the application of existing rules are offered.

## Introduction

Locating, accessing, and using information resources on the Internet, a global computer network of networks, can be difficult, time-consuming, and sometimes impossible. In this new and rapidly expanding electronic environment, network users have unprecedented access to information and computing resources. However, the development and implementation of systematic methods of describing and accessing information lag behind deployment of the Internet itself. The ability for network users to share information surpasses by far their ability to discover information on the Internet. Traditional library services such as cataloging have yet to find widespread application in this emerging environment.

Funded by the U.S. Department of Education, Library Programs, the OCLC Internet Resources project investigated the nature of electronic textual information accessible via the Internet. This empirical study also explored the practical and theoretical problems associated with providing traditional library services for electronic text in a wide-area network environment. This report presents the findings and recommendations arising from the project, as well as suggested areas for further study.

## Objectives

The primary objectives of this project were (1) to provide an empirical analysis of textual information on the Internet, (2) to test the suitability of current cataloging rules and record formats governing the creation of machine-readable cataloging records, and (3) to develop recommendations that would assist the efforts of standards bodies and others interested in systematically cataloging or otherwise describing and providing access to electronic information objects available through remote network access.

## Methods

Project methods include (1) locating, collecting, and analyzing a sample of textual information objects derived from sources accessible via the Internet, (2) developing and testing a taxonomy of electronic information based on the sample, (3) identifying and analyzing problems associated with cataloging and providing appropriate levels of access to this information.

### Reference Sources

The early focus of the project was to collect sample text documents from Internet sources. In fall 1992, when the project was initiated, few resources existed to describe or assist access to Internet resources.[1] In the year of the study, print and electronic guides, directories, and other reference materials have proliferated, and general discussion of the Internet moved from government, technical, or trade publications to the popular press. See Appendix E for an annotated bibliography of materials collected by project staff.

Not surprisingly, much of the information about Internet resources is published, at least originally, in electronic form for distribution across the network. For the novice network user and those without Internet access, this is a hindrance to knowledge and a source of frustration. In recognition of this problem, several quality users guides have been published recently in traditional book form.[2]

In addition to print and electronic reference tools, project staff used an array of systems specifically designed to assist the discovery and access of Internet resources. These electronic aids included WAIS (Wide Area Information Server) by Thinking Machines Corporation,[3] Gopher by the University of Minnesota,[4] archie by McGill University,[5] Hytelnet by Peter Scott,[6] and electronic conferences.[7] These methods were augmented by electronic mail and online browsing.

### Information Map

The characteristics, location, and methods of obtaining electronic information on the Internet derive, at least in part, from the nature of the Internet itself. As of November 1992, the Internet comprised 8,561 different networks supporting at least 727,000 host computers in 44 countries communicating via the common TCP/IP protocol (Transmission Control Protocol/Internet Protocol.)[8] By any measure—total networks, packets, bytes—the Internet has grown remarkably during the period of this study (figures 1–3).

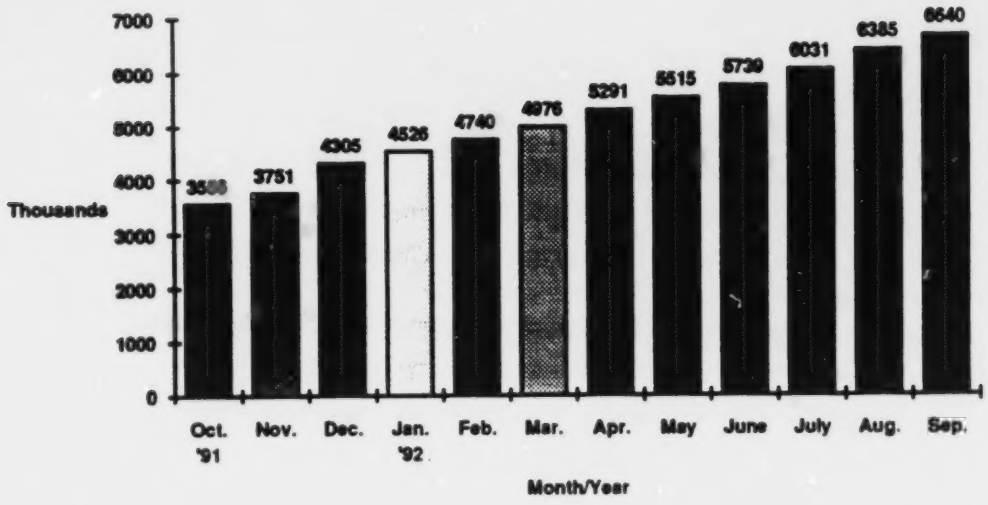


**Figure 1. Internet Growth: Number of Networks Comprising the Internet**

(Source: Merit Network, Inc.)

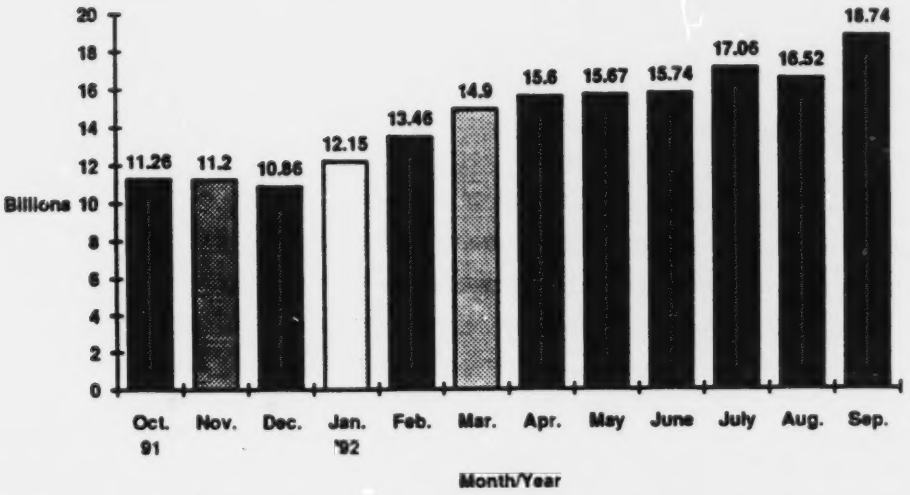


**Figure 2. Growth of Network Traffic in Packets**

(Source: Merit Network. Inc.)

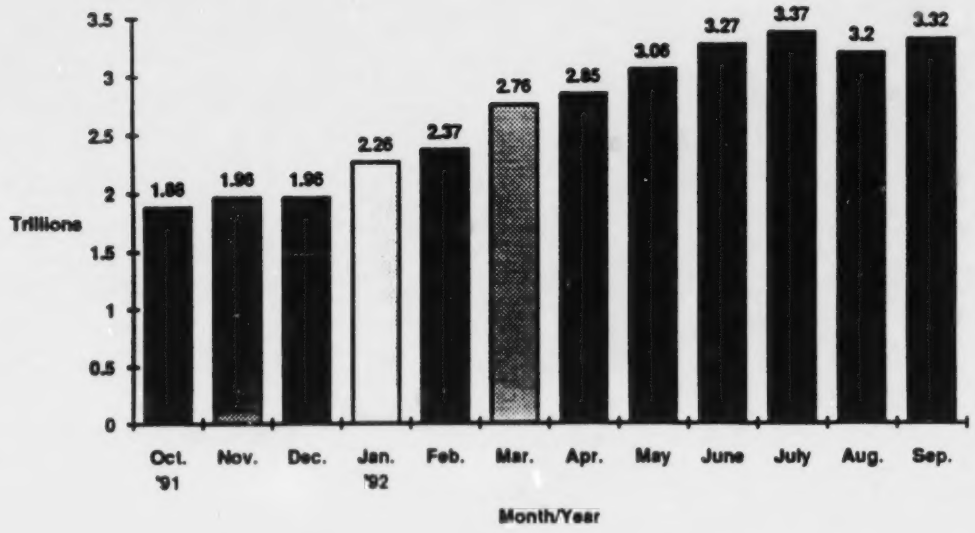


**Figure 3. Growth of Network Traffic in Bytes**

(Source: Merit Network, Inc.)

The TCP/IP protocol suite provides three primary application services: Telnet, File Transfer Protocol (FTP), and electronic mail (Simple Mail Transfer Protocol, SMTP). Each protocol provides a distinct network function:

- Telnet allows network users to log on a remote and communicate with a remote host computer as if there were a direct connection between them.
- FTP allows users to transfer files between remote and local computers. Many host computers maintain an accessible storage area for publicly accessible files.
- Electronic mail allows users to send and receive mail messages between host computers.

All three protocols enable the exchange of textual information; thus systems and sites providing or facilitating access to text files using these protocols are of interest to this study. The amount of network traffic by protocol is shown in figures 4 and 5.

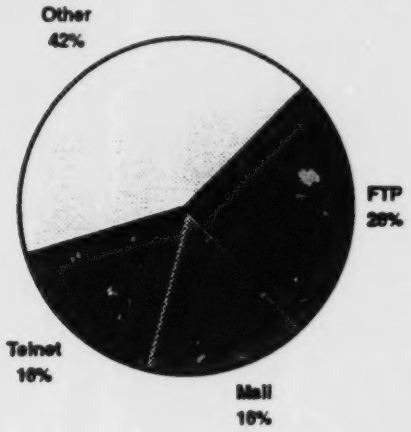


**Figure 4. Percentage of Network Traffic in Packets by Protocol November 1992**

(Source: Merit Network, Inc.)

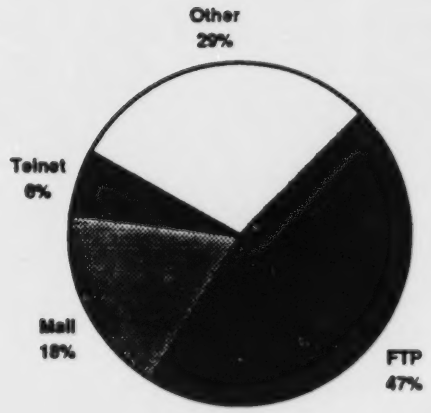


**Figure 5. Percentage of Network Traffic in Bytes by Protocol November 1992**

(Source: Merit Network, Inc.)

Another major source of electronic information is BITNET, a worldwide "store-and-forward" network of IBM computers linking more than 3,000 host computers. BITNET protocol provides the following major application services:

- LISTSERV software manages the exchange of information using mailing lists. Many online conference and discussion lists are based on this software, and many listserv sites archive data.
- Electronic mail enables users to exchange information directly with other users as well as to submit commands to remote network hosts.

There is a gateway between BITNET and Internet, and to the user, the network boundaries are becoming increasingly less apparent. This project focuses on textual information available via the Internet regardless of the network of origin or the protocol used to disseminate or access the information.

An informal cooperative network, USENET,[9] provides another significant source of textual information. As of November, 1992, some 4,000 USENET newsgroups generated approximately 29 Mb of news daily.[10]

An overview of Internet, BITNET, and USENET information resources appears in table 1.

### Document Collection

Using the primary Internet and BITNET protocols, project staff collected approximately 1,200 text documents from various Internet sources including FTP sites, LISTSERV hosts, and interactive mail applications. These files were manually examined and separated into various categories based on their primary content, format, or function (table 2) ranging from books and electronic journals to informal personal communications. (Although e-mail is beyond the scope of this project, some text files residing in publicly accessible directories are e-mail messages that have been saved. Determining this before retrieving the file is often impossible.)

**Table 1. Overview of Internet Resources (Summer 1992)**

| | | Source | | |
|---|---|---|---|---|
| **Type** | **No.** | **Internet** | **BITNET** | **USENET** |
| FTP Sites | 1,044 | X | | |
| FTP Files | 3.1 million | X | | |
| BITNET Servers | 327 | | X | |
| Conferences | 3,275 | X | X | |
| E-Journals | 26 | X | X | |
| E-Newsletters | 72 | X | X | |
| E-Digests | 16 | X | X | |
| Telnet Sites | | X | | |
| Library Catalogs | 337 | X | | |
| Other | 156 | X | | |
| Computer Centers | 18 | | | |
| USENET Newsgroups | 3,941 | | | X |

**Table 2. Profile of Document Sample**

| | | | |
|---|---|---|---|
| Abstracts | Announcements | Articles | Bibliographies |
| Bills | Biographies | Books | Briefs |
| Brochures | Bulletins | Charters | Conferences |
| Dictionaries | Digests | Directories | Documentation |
| Drafts | E-Mail | Editorials | Encyclopedias |
| Essays | Fact Sheets | Glossaries | Guides |
| Hearings | Humor | Indexes | Journals |
| Lists | Lyrics | Manuals | Minutes |
| Monthly Reports | Newsletters | Notes | Poetry |
| Policies | Press Releases | Profiles | Proposals |
| Public Laws | Publicity | Quotations | Readme Files |
| Recommendations | Reports/Papers | RFCs | Standards |
| Statements | Summaries | Surveys | Theses |
| Testimonies | Tutorials | Weather | Workshops |

The initial document collection was created often as the result of directed searching, i.e, one document or information source would point to another. This introduces a bias into the collection, but does not prohibit preliminary analyses. To reduce the bias, a second collection will be gathered using automated methods developed by project staff.

### Preliminary Analysis

One hundred documents from the collection were selected for manual analysis. Information gained during this phase assisted development of software to perform automated document analyses, as discussed later.

Project staff examined each document to determine its characteristics and create a simple cataloging record. Not surprisingly, the completeness of information useful for cataloging the documents ranged greatly. Some electronic journals, for example, provided considerable descriptive data (e.g., title, volume and issue numbers, date, International Standard Serial Number) whereas other document types had none.

Of the one hundred documents, 96 provided some sort of information at the head of the file, before the text proper; 30 included additional information at the end of the file, following the text proper. Ninety documents had an identifiable title, but only 73 had an identifiable author, Fewer yet, only 64, had any kind of date (table 3).

**Table 3. Bibliographic Data in 100-Document Sample**

| No. | Info. at Head of File | Info. at Tail of File | Title | Author | Date |
|---|---|---|---|---|---|
| 100 | 96 | 30 | 90 | 73 | 64 |

### Analysis of FTP Sites

The TCP/IP protocol suite provides the File Transfer Protocol, allowing the transfer of electronic files among remote computers. A feature of this protocol allows users to log on to remote computers on which they do not have an account as an "anonymous" user. Users can traverse the computer's file structure, display directory and file names, and initiate the transfer of files from or to the remote site. The File Transfer Protocol prevents users from accessing other portions of the computer's file system.

Using FTP, system administrators can designate computers as anonymous FTP servers, that is, computers allowing anonymous FTP access to a store of files. The File Transfer Protocol greatly facilitates the exchange of information among Internet users.

## Method

Investigation of electronic documents was twofold: (1) manual collection and analysis, and (2) computer-assisted statistical analyses and automated categorization. Each of these methods is described in the following sections.

### File Collection and Analysis

The early focus of the project was to collect sample text documents from Internet sources. Project staff used an array of resources to discover the whereabouts of electronic text, including printed books, journal articles, and newsletters; online electronic publications and lists; information discovery tools such as WAIS (Wide Area Information Server) by Thinking Machines Corporation, Gopher by the University of Minnesota, and archie by McGill University; hypertext programs; electronic conferences; e-mail; and online browsing.

Project staff sought to categorize and quantify the information available via FTP sites automatically. This investigation was facilitated by data collected by the archie service, developed by Peter Deutsch and Alan Emtage of McGill University. The archie service is an early entry into the field of wide-area information discovery. In short, the archie service has developed software that attempts to discover anonymous FTP sites and their contents. The software initiates an anonymous FTP logon at Internet host sites, cycling through the entire list of sites approximately once every thirty days. If the anonymous FTP logon is successful, the software executes a recursive listing of the FTP site's directories, thus obtaining a list of every available file at the site. The file names extracted from the FTP sites are stored in a file and mounted in a searchable database. Users of the archie service can search the database for file names, and the system will provide the Internet address for sites containing files whose names match the user's query.

The archie service is a ready source of information about FTP sites and provides data to generate a statistical snapshot of Internet resources. The file containing the list of FTP sites and the file listings is itself available via FTP, and project staff obtained it for processing and analysis. Project staff manipulated the archie listing data to create a database containing fields and data elements as shown in table 4.

**Table 4. Data Fields and Sample Data Elements**

| Site | Path | Name | Size | Date | Extension | Compressed |
|---|---|---|---|---|---|---|
| a.cs.uiuc.edu | pub/Leif: | README.DIST | 1918 | Feb 27 | .DIST | N |
| a.cs.uiuc.edu | pub/Leif: | compress.tar | 133120 | Mar 17 | .tar | N |
| a.cs.uiuc.edu | pub/Leif: | diff-18.52.tar.Z | 35049 | Mar 28 | .52.tar.Z | Y |
| a.cs.uiuc.edu | pub/Leif: | leif-doc.tar | 174080 | Mar 28 | .tar | N |
| a.cs.uiuc.edu | pub/Leif: | leif.tar.Z | 578618 | Feb 9 | .tar.Z | Y |
| a.cs.uiuc.edu | pub/Leif: | symlink.tar.Z | 1807 | Mar 28 | .tar.Z | Y |

To discover trends in the growth of FTP sites, we obtained this data periodically. This sampling revealed rapid growth in the number of FTP sites during the time of this study, the number of files available at these sites, and the amount of data stored on magnetic disk (table 5).

**Table 5. Growth of FTP Sites**

| Date | No. Sites | +(%) | No. Files | +(%) | Size (GB) | +(%) |
|---|---|---|---|---|---|---|
| 1/92 | 829 | | 2,089,544 | | 101.02 | |
| 8/92 | 1,044 | 25.93 | 3,059,689 | 46.43 | 165.05 | 63.38 |

To begin to get a sense of the make up of these FTP sites, we selected 20 sites at random for closer analysis (figure 6 and table 6). This sample clearly shows a wide range of profiles by every measure, including total number of files at a site (from 12 to 38,440), the total amount of data stored (from 104,969 to 913,679,044 bytes), the largest file (from 45,056 to 28,437,472 bytes), and average file size (8,747 to 2,530,930 bytes). The distribution of data among the sample sites is uneven, for example, csam.lbl.gov has only 57 files, yet it contains the largest file in the sample (28,437,472 bytes) and has the largest average file size (2,530,930 bytes). In contrast, the largest site in the sample, lth.se, has both the most files (38,440) and the most storage (913,679,044 bytes), but a comparatively low average file size (23,768).

| | | |
|---|---|---|
| a.cs.uiuc.edu | archive.cis.ohio-state.edu | boombox.micro.umn.edu |
| csam.lbl.gov | dsl.cis.upenn.edu | ftp.cica.indiana.edu |
| gem.stack.urc.tue.nl | hubcap.clemson.edu | jhname.hcf.jhu.edu |
| lth.se | merit.edu | nic.mr.net |
| okeeffe.cs.berkeley.edu | paul.rutgers.edu | research.att.com |
| shemp.cs.ucla.edu | suna.osc.edu | turbo.bio.net |
| uop.uop.edu | watcgl.waterloo.edu | |

**Figure 6. 20 Sample Sites**

**Table 6. Survey of 20 Sample FTP Sites by Number of Files**

| Site Name | No. Files | Total Bytes | Largest File (Bytes) | Average File (Bytes) |
|---|---|---|---|---|
| lth.se | 38,440 | 913,679,044 | 13,344,768 | 23,768 |
| research.att.com | 9,102 | 257,800,968 | 8,752,643 | 28,323 |
| archive.cis.ohio-state.edu | 8,843 | 669,287,526 | 7,287,625 | 75,685 |
| merit.edu | 1,696 | 147,797,681 | 2,546,131 | 87,144 |
| ftp.cica.indiana.edu | 1,475 | 167,161,346 | 2,052,422 | 113,329 |
| hubcap.clemson.edu | 726 | 75,764,452 | 5,455,054 | 104,358 |
| a.cs.uiuc.edu | 459 | 65,460,295 | 6,097,773 | 142,615 |
| turbo.bio.net | 390 | 16,851,476 | 750,368 | 43,208 |
| boombox.micro.umn.edu | 382 | 36,239,511 | 2,047,933 | 94,867 |
| dsl.cis.upenn.edu | 134 | 6,102,098 | 816,261 | 45,538 |
| gem.stack.urc.tue.nl | 142 | 13,309,519 | 1,081,976 | 93,729 |
| okeeffe.cs.berkeley.edu | 115 | 18,078,337 | 3,853,003 | 157,202 |
| nic.mr.net | 124 | 9,552,240 | 1,854,848 | 77,034 |
| watcgl.waterloo.edu | 124 | 3,352,867 | 1,033,077 | 27,039 |
| shemp.cs.ucla.edu | 58 | 8,393,452 | 1,696,416 | 144,714 |
| csam.lbl.gov | 57 | 144,263,025 | 28,437,472 | 2,530,930 |
| paul.rutgers.edu | 19 | 1,638,718 | 602,699 | 86,248 |
| suna.osc.edu | 18 | 1,574,391 | 342,822 | 87,466 |
| uop.uop.edu | 16 | 4,174,683 | 784,987 | 260,917 |
| jhname.hcf.jhu.edu | 12 | 104,969 | 45,056 | 8,747 |

The largest 40 FTP sites are shown in table 7. At the time of our sampling, the largest FTP site on the Internet in terms of total files and total storage was src.doc.ic.ac.uk; the largest file, "db.pag" (1,846,821,888 bytes), was also at this site. These 20 largest sites, or 2% of Internet FTP sites, account for 57% of the available files and 38% of the storage, again revealing the disproportionate distribution of data and the significant contribution made by several large sites.

## Table 7. 40 Largest FTP Sites by Number of Files

| Site Name | No. Files | Total Bytes | Largest File | Average File |
|---|---|---|---|---|
| src.doc.ic.ac.uk | 170,966 | 7,923,289,150 | 1,846,821,888* | 46,344 |
| wuarchive.wustl.edu | 147,173 | 6,039,051,548 | 30,121,209 | 41,033 |
| capella.eestech.mcgill.ca | 131,262 | 5,199,556,552 | 30,121,209 | 39,612 |
| mcsun.eu.net | 109,483 | 1,065,088,972 | 12,082,830 | 9,728 |
| ists.kuis.kyoto-u.ac.jp | 76,880 | 4,022,047,707 | 24,169,327 | 52,315 |
| usc.edu | 67,288 | 289,291,834 | 12,886,016 | 4,299 |
| gatekeeper.dec.com | 67,100 | 4,279,830,040 | 44,877,484 | 63,782 |
| toklab.ics.osaka-u.ac.jp | 65,135 | 2,237,389,271 | 25,518,080 | 34,350 |
| ftp.uu.net | 59,506 | 2,689,716,008 | 10,573,106 | 45,199 |
| plaza.aarnet.edu.au | 54,046 | 3,677,983,744 | 30,121,209 | 68,052 |
| athene.uni-paderborn.de | 49,418 | 2,486,320,000 | 11,534,336 | 50,312 |
| stis.nsf.gov | 40,792 | 102,695,505 | 5,124,940 | 2,517 |
| emx.cc.utexas.edu | 40,550 | 478,590,134 | 4,841,472 | 11,802 |
| erratic.bradley.edu | 38,687 | 987,391,765 | 5,458,229 | 25,522 |
| ipc1.rrzn.uni-hannover.de | 38,511 | 1,291,990,465 | 33,144,095 | 33,548 |
| lth.se | 38,440 | 913,679,044 | 13,344,768 | 23,768 |
| faui43.informatik.uni-erlangen.de | 35,091 | 2,214,839,896 | 12,881,920 | 63,117 |
| cs.ubc.ca | 33,744 | 1,460,556,438 | 20,200,637 | 43,283 |
| arp.anu.edu.au | 32,142 | 126,915,618 | 2,803,093 | 3,948 |
| rusmv1.rus.uni-stuttgart.de | 28,963 | 1,573,641,267 | 46,097,964 | 54,332 |
| rs3.hrz.th-darmstadt.de | 28,953 | 1,256,056,195 | 18,361,475 | 43,382 |
| srawgw.sra.co.jp | 26,033 | 953,046,411 | 18,446,065 | 36,609 |
| cs.orst.edu | 25,818 | 695,549,118 | 14,214,985 | 26,940 |
| gmdzi.gmd.de | 25,689 | 572,321,306 | 7,721,695 | 22,278 |
| world.std.com | 24,653 | 920,748,338 | 11,150,037 | 37,348 |
| rigel.acs.oakland.edu | 23,502 | 1,156,059,055 | 2,104,156 | 49,189 |
| cs.dal.ca | 23,075 | 56,928,511 | 1,584,152 | 2,467 |
| sunic.sunet.se | 22,394 | 437,927,999 | 8,438,192 | 19,555 |
| export.lcs.mit.edu | 21,548 | 598,553,818 | 13,221,021 | 27,777 |
| samba.acs.unc.edu | 21,428 | 1,692,007,479 | 30,121,209 | 78,962 |
| kth.se | 20,400 | 544,148,043 | 7,178,829 | 26,673 |
| ftp.uni-kl.de | 20,109 | 1,550,398,950 | 11,644,477 | 77,099 |
| sun0.urz.uni-heidelberg.de | 19,492 | 1,115,669,547 | 13,221,021 | 57,237 |
| nz20.rz.uni-karlsruhe.de | 18,871 | 464,280,390 | 14,950,809 | 24,602 |
| swdsrv.edvz.univie.ac.at | 18,657 | 1,842,921,999 | 19,128,073 | 98,779 |
| cs.tut.fi | 18,583 | 579,138,889 | 92,953,575 | 31,164 |
| theta.iis.u-tokyo.ac.jp | 18,380 | 1,175,014,496 | 27,606,515 | 63,928 |
| uxc.cso.uiuc.edu | 17,727 | 329,145,305 | 8,575,817 | 18,567 |
| x11.informatik.uni-dortmund.de | 17,048 | 1,236,901,481 | 13,221,021 | 72,554 |
| gdr.bath.ac.uk | 16,398 | 954,559,680 | 6,656,138 | 58,211 |
| Total | 1,753,937 | 67,191,241,968** | | |

* Largest file at Internet FTP site: /ic.doc/whois/db.pag.

** The top 20 Internet sites account for 57% of the available files and 38% of the storage.

### Directories, Paths, and File Names

Collectively, the Internet's anonymous FTP sites may be viewed as an archive or "library" of electronic information. Project staff investigated the methods used to classify, describe, and facilitate the location of and access to information at these sites.

Apart from the FTP site names (IP addresses), other indicators of the type and nature of information available at the site include the directory names, path names (a series of directory names), and the individual file names. Minimally, any particular file will have a file name, directory name, and site name associated with it. Each of these names may provide meaningful information about the nature and contents of a file. In aggregate, these names may produce a cogent hierarchy of descriptors or they may be nearly unintelligible to anyone but the creator of the directory/path/file-name structure.

The directory and path names provide access points to the information contained at the FTP site. Project staff examined the granularity of these access points (table 8). On average, a typical file has fewer than three (2.47) associated content indicators, including the file name. This indicates that the hierarchical file structure at most FTP sites is rather shallow. This level of granularity provides minimal aids for describing or, conversely, discovering information.

**Table 8. Directories at FTP Sites**

| | |
|---|---|
| Sites | 1,044 |
| Directories | 192,446 |
| Directories/site (avg.) | 185.22 |
| Top-level directories | 4,861 |
| Top-level directories/site (avg.) | 4.68 |
| Maximum directory nodes* | 20 |
| Average directory nodes* | 2.47 |

* Number of nodes in directory path including file name (std 1.26).

### Readme and Index Files

FTP sites may contain text files that provide additional descriptive information about the contents the site, a particular directory, or particular files. These informational files are often named "readme," "index," or some variation thereof in combination with other

characters. The wide range of file names is evident from samples selected from the site wuarchive.wustl.edu (figure 7). The value of these informational files can vary greatly depending on the completeness, clarity, and currency of the descriptive information provided. Manual analysis of the contents of readme and index files showed a low correlation between contents of the files and the file names present in the related directory.

| | | |
|---|---|---|
| #README# | README-5.00.17b | master-index.Z |
| 00README | read_me.nr | old.index |
| 00readme.1st | read_me.nr.Z | rfc-index.txt |
| aaaread.me | read_me.txt | VR.Index |
| asteroids.readme | READ_ME.Z | 00Index.022891 |
| docs.readme | xfig.README | aborig-hist-jrnl-index.txt.Z |
| nfread.me | 00-index.lst | FILEINDEX.080492 |
| READ-ME | 00-index.txt | diskindex |
| READ-ME-FIRST | 00-index.Z | INDEX.OSFDOCS |
| READ-ME.txt | Index | Index.zip |
| READ.ME | index.doc | INDEX.statistics |
| read.me! | index12.1.Z | index16.8-14.Z |
| read.this.first.Z | INDEXTS.ZIP | |
| readme | lastindex.Z | |

**Figure 7. Examples of Readme and Index File Names**

Project staff examined the frequency of these auxiliary informational files in a 20-site sample (table 9). Based on this sample, there is one readme file for every 3.5 directories and one index file for every seven directories. Thus, despite the potential utility of these files, they occur infrequently.

**Table 9. README and Index Files in 20 Sample FTP Sites***

| Site Name | Dir's | Files/ Dir. | Readme's | Indexes | Readme's/ Dir. | Indexes/ Dir. |
|---|---|---|---|---|---|---|
| lth.se | 1,970 | 19.51 | 427 | 114 | 0.22 | 0.06 |
| archive.cis.ohio-state.edu | 531 | 16.65 | 131 | 71 | 0.25 | 0.13 |
| research.att.com | 220 | 41.37 | 68 | 193 | 0.31 | 0.88 |
| a.cs.uiuc.edu | 75 | 6.12 | 33 | 0 | 0.44 | 0.00 |
| boombox.micro.umn.edu | 65 | 5.88 | 51 | 0 | 0.78 | 0.00 |
| merit.edu | 62 | 27.35 | 14 | 0 | 0.23 | 0.00 |
| hubcap.clemson.edu | 46 | 15.78 | 126 | 5 | 2.74 | 0.11 |
| ftp.cica.indiana.edu | 38 | 38.82 | 5 | 32 | 0.13 | 0.84 |
| watcgl.waterloo.edu | 23 | 5.39 | 6 | 0 | 0.26 | 0.00 |
| dsl.cis.upenn.edu | 19 | 7.05 | 14 | 0 | 0.74 | 0.00 |
| gem.stack.urc.tue.nl | 18 | 7.89 | 10 | 0 | 0.56 | 0.00 |
| nic.mr.net | 14 | 8.86 | 8 | 2 | 0.57 | 0.14 |
| turbo.bio.net | 12 | 32.50 | 3 | 8 | 0.25 | 0.67 |
| okeeffe.cs.berkeley.edu | 11 | 10.45 | 2 | 19 | 0.18 | 1.73 |
| shemp.cs.ucla.edu | 9 | 6.44 | 1 | 0 | 0.11 | 0.00 |
| paul.rutgers.edu | 7 | 2.71 | 0 | 0 | 0.00 | 0.00 |
| sam.lbl.gov | 7 | 8.14 | 9 | 0 | 1.29 | 0.00 |
| suna.osc.edu | 6 | 3.00 | 2 | 0 | 0.33 | 0.00 |
| cjhname.hcf.jhu.edu | 5 | 2.40 | 1 | 0 | 0.20 | 0.00 |
| uop.uop.edu | 4 | 4.00 | 0 | 0 | 0.00 | 0.00 |
| Totals | 3,142 | | 911 | 444 | | |

* For the 20 sample sites there is an average 1 README file for approximately every 3.5 directories and 1 index for every 7 directories.

### Types of Files at FTP Sites

Determining the contents of FTP sites based on readme and index files is impractical, and the amount of information provided is insufficient to assist analysis of the aggregate FTP collection. Therefore, project staff sought to determine the composition of the aggregate FTP sites using automated methods.

The chief and most readily available guides to the nature and contents of files at FTP sites are the directory and file names. Drawing from the 20-site sample, project staff compiled a list of all path names (the complete hierarchical path for each file in the data set), which were then counted and sorted by frequency (table 10). (A directory name was counted each time it occurred in a path for a file. Thus, while the /pub directory had the most associated files, it likely occurred only once in file hierarchy at any given site.) The directory names in this sample set are highly idiosyncratic but nevertheless representative of the type of information provided by hierarchical naming structures.

To assess the correlation between directory names and file types, project staff created a list of the top 500 directory names drawn from a data set of 1,044 FTP sites. This list was manually reviewed, a subset of "meaningful" directory names was derived, and major categories of files types were established. Project staff obtained sample files from selected FTP sites containing key directory names in the file hierarchy. The files were examined, and correlations between file types and directory names were noted. This process was repeated, and the list of directory names was refined.

The list of directory names served as the basis for a dictionary of regular expressions (rules allowing the matching of various combinations of upper- and lowercase characters, variant spellings, and partial character strings). This process was repeated to refine the dictionary and matching rules. The dictionary entries and matching rules appear in Appendix C.

**Table 10. Top 50 Directory Nodes by Frequency from 20 Random FTP Sites**

| Name | Freq. | Name | Freq. |
|---|---|---|---|
| pub | 22,144 | volume88 | 1,668 |
| sys.sun | 15,777 | gnu | 1,469 |
| volume90 | 11,463 | games | 1,408 |
| volume91 | 8,554 | mac | 1,395 |
| volume89 | 8,534 | sources.games.bugs | 1,315 |
| ArchiveVol2 | 8,056 | sources.x | 1,305 |
| lists.sun-managers | 6,476 | info-mac | 1,276 |
| 4.3bsd-reno | 4,309 | sources.unix | 997 |
| alt.sources | 3,957 | lib | 943 |
| jun | 3,527 | emacs | 846 |
| mar | 3,010 | usr.bin | 839 |
| may | 2,999 | images | 786 |
| ArchiveVol1 | 2,977 | poskanzer | 785 |
| jul | 2,698 | Makefile | 774 |
| jan | 2,562 | sources.games | 752 |
| apr | 2,518 | sys | 742 |
| aug | 2,505 | unsorted | 731 |
| feb | 2,400 | tcpip | 722 |
| dec | 2,387 | rfc | 709 |
| comp.sources.unix | 2,384 | pc | 670 |
| nov | 2,122 | elisp-archive | 652 |
| sources.misc | 2,120 | unix_util | 652 |
| sources.bugs | 1,786 | win3 | 649 |
| oct | 1,757 | libc | 639 |
| sep | 1,733 | TeX | 543 |

Using the data dictionary and matching rules, project staff developed software to parse directory path names, thus enabling automated classification of files based on analyses of attendant information.

The matching rules were weighted to improve accuracy. For example, directory nodes farthest from the root directory were thought to contain more latent classification information then those nearer the root level. This assumes that the taxonomy of directory names is, in fact, logically, not just functionally, hierarchical and tending toward greater specificity. However, specificity and meaningfulness are not correlatives. File names following a decimal numeration, date, volume, series, or other scheme (e.g., 910927.01, Spec_#0.4.txt, v3n4) may indeed be named quite specifically, but the name has meaning only in a larger scheme and does not reflect the content of the file. This dilemma may be apparent throughout or at any point in the directory structure. Matching is confounded by directory/path names that bear little or no direct relationship with the contents of a directory node or file.

### Summary Analyses

Two random samples of 20 FTP sites were extracted from the total then available from the archie listings file. The data was then parsed, yielding the classification and statistical analyses shown in table 11 and figure 8. The percentage of file types for the two samples were very similar, giving a measure of confidence in the algorithm.

**Table 11. Automated File Type Analysis**

| Category | Sample 1 (%) | Sample 2 (%) |
|---|---|---|
| System | 52.6 | 54.2 |
| Source | 21.3 | 21.4 |
| Text | 7.4 | 7.3 |
| Unknown | 6.0 | 7.3 |
| Game | 5.4 | 3.8 |
| Image | 2.4 | 1.9 |
| PC | 1.8 | 2.0 |
| Executable | 1.8 | 0.6 |
| Data | 0.8 | 1.1 |
| Font | 0.3 | 0.3 |
| News | 0.2 | 0.2 |

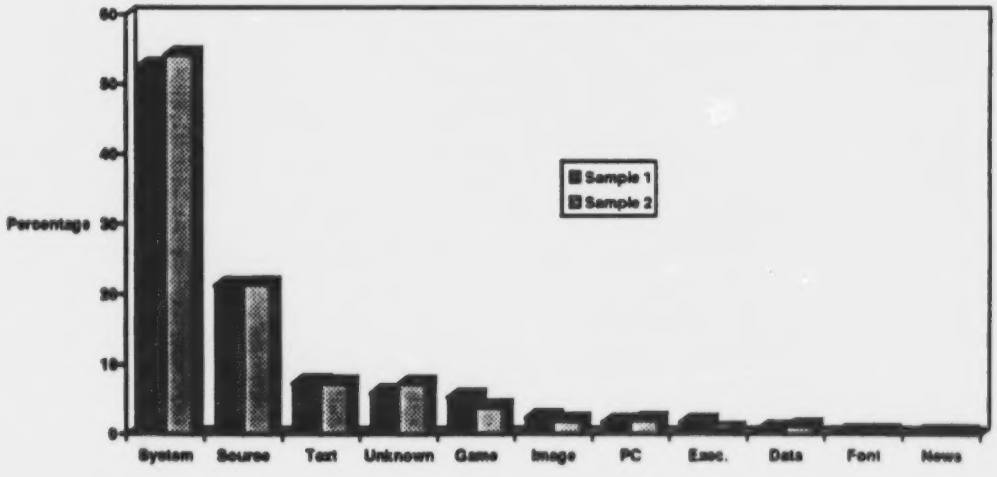


**Figure 8. Comparative Analyses of Two 20-Site Samples**

The rules for categorizing files were changed based on an analysis of the results of the two 20-site samples, and the categories were adjusted (figure 9). The file categorization program was run against the entire archie "listings" file of 1,044 sites. The results of this analysis appear in table 12 and figure 10.

| | | |
|---|---|---|
| System | Source | Text |
| Data | Images | Games |
| PC | Executable files | News |
| Unknown | | |

**Figure 9. File Categories**

**Table 12. Automated File Type Analysis—1,044 FTP Sites**

| | Files | | MBytes | |
|---|---|---|---|---|
| Category | No. | (%) | No. | (%) |
| Source | 669,178 | 22 | 25,615 | 22 |
| System | 636,581 | 21 | 31,653 | 27 |
| Unknown | 630,492 | 21 | 35,889 | 30 |
| News | 363,931 | 12 | 4,190 | 4 |
| Text | 309,552 | 10 | 9,545 | 8 |
| PC | 216,905 | 7 | 12,702 | 11 |
| Data | 80,552 | 3 | 3,127 | 3 |
| Image | 78,579 | 3 | 6,169 | 5 |
| Game | 41,269 | 1 | 2,026 | 2 |
| Executable | 29,025 | 1 | 2,628 | 2 |

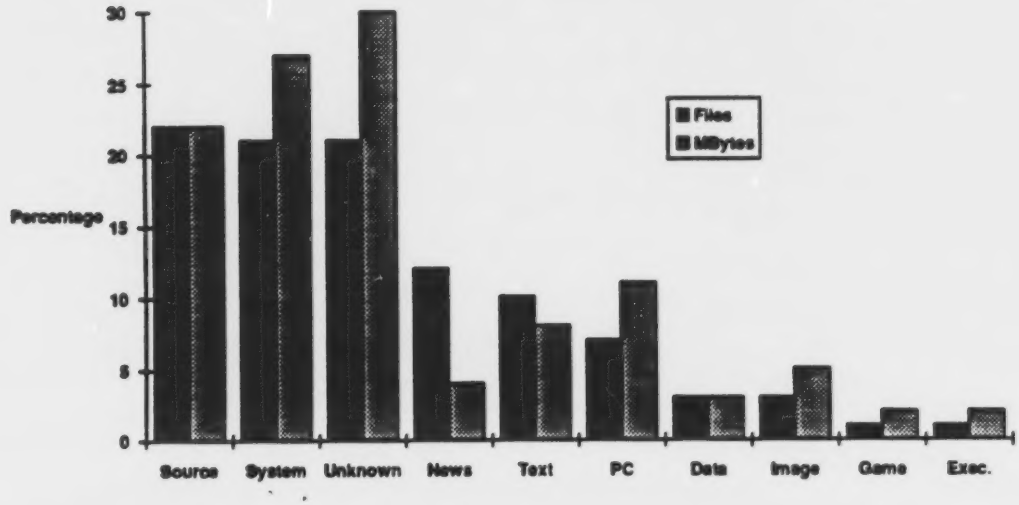


**Figure 10. Number and Size of Files by Type—1,044 Sites**

### Performance Analysis

In general, the categorization and distribution of files in the final experiment was in keeping with expectations based on the two earlier sample sets. However, the number and percentage of files that could not be classified automatically increased, ranging from .1% to 100% at a given site. This prompted an analysis of the performance of the algorithm.

The experiment yielded statistical analyses of each of the 1,044 sites. Performance of the classification software was compared at two large, one medium, and one small FTP site (table 13).

**Table 13. Performance Analysis—Unknown Files**

| | | Unknown | | | |
|---|---|---|---|---|---|
| Site | Total | Number | (%) | Size (Bytes) | (%) |
| wuarchive.wustl.edu | 147,165 | 9,088 | 6.2 | 850,304,141 | 14.1 |
| lth.se | 38,439 | 604 | 1.6 | 45,987,046 | 5.0 |
| export.lcs.mit.edu | 21,546 | 14 | 0.1 | 3,221,515 | 0.5 |
| ascwide.ascii.co.jp | 3,293 | 341 | 10.4 | 29,138,247 | 11.5 |

Analysis of 1,044 sites reveals a general trend: larger sites tend to have deeper and more meaningful hierarchies, thus enabling a higher percentage of files to be categorized automatically. A performance analysis based on the size of the FTP sites (in number of files and bytes) appears in table 14.

**Table 14 Performance Analysis—Files Automatically Categorized (%)**

| | Size of Site (Files) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0–100 | | 100–500 | | 500–1,000 | | 1,000–5,000 | | >5,000 | | All | |
| Type | No. | Bytes | No. | Bytes | No. | Bytes | No. | Bytes | No. | Bytes | No. | Bytes |
| Unknown | 70 | 72 | 55 | 52 | 49 | 49 | 35 | 34 | 15 | 22 | 21 | 30 |
| Source | 6 | 11 | 12 | 16 | 9 | 10 | 15 | 17 | 24 | 27 | 22 | 22 |
| System | 8 | 9 | 15 | 20 | 12 | 21 | 14 | 22 | 23 | 32 | 21 | 27 |
| News | 1 | 1 | 2 | 1 | 1 | 0 | 6 | 2 | 14 | 5 | 12 | 4 |
| Text | 7 | 3 | 7 | 3 | 11 | 7 | 16 | 8 | 9 | 9 | 10 | 8 |
| PC | 1 | 1 | 3 | 2 | 6 | 5 | 5 | 7 | 8 | 15 | 7 | 11 |
| Image | 1 | 1 | 2 | 3 | 5 | 4 | 4 | 5 | 2 | 6 | 3 | 5 |
| Data | 0 | 0 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 |
| Games | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 |
| Exec. | 4 | 2 | 1 | 1 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 |

Examination of sites with a high percentage of unknown files, such as cs.utexas.edu (table 15), reveal typical problems: shallow directory structures and highly idiosyncratic naming conventions. These two factors primarily account for the higher incidence of unknown files at small sites.

**Table 15. Analysis of Site cs.utexas.edu**

| Type | No. | (%) | Size | (%) |
|---|---|---|---|---|
| Unknown | 311 | 85.7 | 27,223,751 | 84.0 |
| Text | 51 | 14.0 | 5,115,143 | 15.8 |
| Exec. | 1 | 0.3 | 53,248 | 0.2 |
| Total | 363 | 100.0 | 32,392,142 | 100.0 |

## Cataloging Experiment

A second goal of this research was an analysis of the theoretical and applied cataloging problems associated with electronic information available over the Internet. Based on the taxonomy earlier established, this investigation focused exclusively on electronic files, information objects whose essential nature, whether for storage, transfer, or use, is electronic.

Current MARC (MAchine-Readable Cataloging) records enable the creation, exchange, and subsequent use of machine-readable descriptive cataloging data for a wide spectrum of media, including books, serials, audiovisual materials, maps, musical scores, realia, and computer files. However, the applicability of the MARC cataloging model to the types of electronic information existing on the Internet was unknown. A systematic experiment was devised to ascertain (1) difficulties encountered by cataloging librarians in determining bibliographic data based on an examination of electronic information objects, and (2) deficiencies in (a) the USMARC format for computer files or (b) the *Anglo-American Cataloging Rules*, second edition, revised.

### Hypotheses

This cataloging experiment tested these hypotheses:

1. The current USMARC Computer Files Format and *Anglo-American Cataloguing Rules*, second edition, revised, chapter 9, Computer Files, are adequate for creating descriptive cataloging records for electronic file resources on the Internet.

2. Electronic file resources on the Internet contain sufficient data elements for creation of minimal-level cataloging records.

3. Catalog records can provide essential access information for electronic file resources on the Internet by incorporating selected fields from the USMARC Format for Holdings and Locations.

### Methods

The hypotheses were tested by cataloging librarians who attempted to create catalog records for actual electronic information objects obtained from Internet sources. Project staff assembled a collection of computer files for this experiment using manual and

automated methods to minimize bias and ensure a heterogeneous mix. The collection contained 300 files representative of files found on the Internet. The test collection focused on text files, which account for approximately 10% of files on the Internet but comprise slightly more than half of the files in the test collection. The text files include electronic books, journals, newsletters, poetry, essays, lyrics, guides, lists, papers, reports, legislation, and a range of informal, unpublished materials including Usenet newsgroup archives.

The remainder of the test collection consists of various types of software and data files such as source code, programs, games, images, and font files. These files are present in the collection in roughly the same proportions as they exist on the Internet, as determined by our earlier sampling; thus, source files predominated.

Items were not selected for inclusion in the test collection based on their merit as candidates for cataloging. The experiment was to test whether the files *could* be cataloged, not whether they *should* be cataloged.

To ensure sufficiently rigorous testing and to minimize difficulties encountered by any single cataloger, each computer file was to be cataloged by three different catalogers.

The 300 experimental files were numbered 001 to 300 and randomly sorted into ten groups of 30 files each. This process was repeated to yield 30 groups of 30 files; each file occurring in three different randomly sorted groups. If each file were cataloged, this would yield 900 catalog records (3 x 300).

For each computer file in the experimental collection, project staff created an and ancillary information file, numbered 001 to 300, which was available to participants in the experiment. The information files contained data related to its associated computer file such as the size of the file in bytes, the original file name, the source from which project staff obtained the file, and additional information for use by project staff only. It was though that this basic information about the file would generally be available to catalogers. It was Moreover, it was necessary to provide the file names, which had been changed to facilitate management of the experiment.

### Requirements for Participation

Participants for the cataloging experiment were solicited via a "Call for Participants" which was posted to several electronic conferences. Project staff made every effort to

ensure widespread opportunity for participation. Responses were received from librarians throughout the world, including Australia, New Zealand, and Hong Kong. The published requirements for participation are given below:

- Participants should have an MLS degree or equivalent, experience cataloging computer files, and a working knowledge of both the USMARC Format for Computer Files and the applicable cataloging rules (*AACR2R*, chapter nine).
- Participants must be willing to catalog 30 computer files within the three-week time-frame of the experiment from May 11-29, 1992.
- Participants must have Internet access, although a limited number of non-Internet sites will be selected, if possible.
- Participants must have access to a word-processing system that can produce ASCII text files.
- Participation is NOT limited to OCLC-member libraries, and online access to OCLC is NOT required.

Thirty-seven librarians responded to the Call. Thirty individuals or teams were selected as primary participants; the remainder were considered auxiliary participants. On average, the 30 primary participants had three years experience cataloging computer files, although experience ranged from one to 12 years.

### Experimental Procedures

Participants were provided with guidelines and instructions (Appendix D). Insofar as possible, all communications and file exchanges related to the experiment took place via the Internet.[11] This communication media was augmented, when necessary, by phone, Fax, and U.S. mail.

Each participant was assigned an identification number from 01 to 30 (auxiliary participants were indicated by the letter "a," e.g., 01a). The identification number corresponded to a similarly numbered set of 30 randomly generated sets of 30 numbers from 001 to 300. Using the File Transfer Protocol (FTP), each participant was to obtain the appropriate set of numbers from an OCLC computer.

Each number in the set corresponds to a similarly numbered computer file to be cataloged. The computer files were named 001 to 300, with the file extension .obj (for "object"), and each associated information file was named 001 to 300, with the extension .info (for "information").

Participants were instructed to retrieved the assigned object and information files from an OCLC computer using the file transfer protocol. Project staff provided a records template. The record template contained the valid fixed-field mnemonics and variable-field tags for the Computer Files format, with the addition of field 852 from the USMARC Format for Holdings and Locations. Participants were to complete the record using whatever cataloging aids were available to them and submit the completed record to OCLC, again using the file transfer protocol. A completed record appears in figure 11.

In addition, participants were requested to complete a log file for each item cataloged, and to record in this file the number of the object file and the time required for cataloging. Optionally, participants could record comments, suggestions, or problems related to the object, the cataloging rules, or the MARC format. A sample log file appears in figure 12.

| | | | | |
|---|---|---|---|---|
| Audience: e | Bib lvl: m | Ctry: xx | Dates: 1988, | Dat tp: s |
| Desc: a | Enc lvl: K | File: d | Frequn: n | Govt pub: |
| Lang: eng | Pub st: | Regulr: | Source: d | Type: m |

040 TXI
100 1 Haynes, Robert.
245 10 Sentinels in the sky $h computer file : $b weather satellites. $n Part I / by Robert Haynes.
250 Updated 8-14-88.
256 Computer data (1 file : 16394 bytes)
260 $c 1988.
516 Text file (report).
538 Online access via Internet.
500 Title from file caption.
520 Describes the history and development of weather satellites in the United States, the roles of NASA and the NOAA in designing them and administering them, and explains their usefulness in relation to oceanography, fisheries, and other areas and in predicting severe weather, rainfall, and forest fires.
852 $z Internet address: $a ames.arc.nasa.gov $b pub/SPACE/SPACELINK $c 6.6.4

**Figure 11. Sample Bibliographic Record**

ID: 26

Object number: 006

Time (min.): 120

036 I initially used this field for the filename, but then after looking at it I decided that it wasn't much use without the rest of the path name, so I took it out.

256 The term computer data seems to indicate some sort of coded data. Maybe there should be a term such as "Text file" to indicate a text file that is simply stored electronically. Also, the number of bytes doesn't have the same meaning as the number of pages. You would want to know the bytes to know how much room it will take up in your disk space, but for a text file you would want to know how many pages there are to read. The no. of bytes could change if there was text formatting and graphics involved, while the actual amount of text would be the same (I think).

516 It seems that the 256 and 516 could be combined into one field. Maybe leave out the 256 and include the size of the file in the 516.

852 I think that if this information is going to make any sense to anyone we need to have labels or free text telling the user what portion of the address or filename is in each subfield. Also, the public note that I put first could be put last if the field had an appropriate label in a PAC display. If we're going to use this field the way it is we should redefine the existing subfields or add new ones to use for electronic addresses and filenames.

**Figure 12. Sample Log File**

## Experimental Results

Of the 300 electronic files in the test collection, one or more bibliographic records were created for 291 (99.7%). For these objects, a total of 714 (79.4%) records were created; 650 (72%) log files were created for 291 (97%) objects.

## Analysis

The bibliographic records created were analyzed automatically and manually. Automated methods determined the occurrence of a particular field, the length of the field, and the degree of similarity among identical fields when more than one record was created for a single object.

The following three scores were obtained algorithmically for each set of records related to a particular object:

1. Similarity—For each object, how similar are the contents of identical fields (character by character)? (This score can only be obtained when two or more records were created for the same object, thus allowing comparison.)

2. Congruence—If a field was used by a cataloger, how often did another cataloger also use that field? (This score can only be obtained when two or more records were created for the same object, thus allowing comparison.)

3. Frequency—How often was any given field used to describe an object?

These scores were then summarized and tabulated for the entire test collection (tables 16–18).

**Table 16. Summary Scores for Test Collection: Fixed Fields**

| | Score* | | |
|---|---|---|---|
| **Field** | **1** | **2** | **3** |
| Audience | 87 | 45 | 18 |
| Bibliographic level | 88 | 93 | 85 |
| Country of publication | 60 | 84 | 69 |
| Dates | 64 | 92 | 83 |
| Date type | 84 | 78 | 64 |
| Descriptive cataloging form | 97 | 94 | 88 |
| Encoding level | 69 | 85 | 69 |
| File: Type of computer file | 91 | 93 | 85 |
| Frequency | 91 | 56 | 31 |
| Government publication code | 80 | 10 | 1 |
| Language code | 90 | 91 | 81 |
| Publication status | 87 | 32 | 18 |
| Regularity | 85 | 32 | 19 |
| Source: Cataloging source code | 97 | 94 | 88 |
| Type of record | 92 | 94 | 88 |

**Table 17. Summary Scores for Test Collection: Variable Fields**

| | | Score | | |
|---|---|---|---|---|
| **Field** | **Name** | **1** | **2** | **3** |
| 020 | International Standard Book Number | 32 | | |
| 022 | International Standard Serial Number | 61 | 4 | 3 |
| 037 | Stock Number | 29 | 28 | 11 |
| 040 | Cataloging Source | 18 | 65 | 38 |
| 041 | Languages | | 4 | |
| 043 | Geographic Area Codes | | 1 | |
| 100 | Main Entry Heading, Personal Name | 83 | 28 | 18 |
| 110 | Main Entry Heading, Corporate Name | 49 | 8 | 2 |
| 130 | Main Entry Heading, Uniform Title | 45 | 1 | |
| 211 | Acronym or Shortened Title | | 1 | |
| 214 | Augmented Title | | 1 | |
| 240 | Uniform Title | | 1 | |
| 245 | Title Statement | 82 | 97 | 93 |
| 246 | Varying Forms of Title | | 8 | 1 |
| 250 | Edition Statement | 61 | 14 | 7 |
| 256 | File Characteristics | 77 | 81 | 65 |
| 260 | Imprint | 62 | 86 | 73 |
| 265 | Source for Acquisition | | 1 | |
| 300 | Physical Description | | 22 | 6 |
| 315 | Frequency | | 7 | 2 |
| 362 | Numeric and/or Alphabetic, Chronological, or Other Designation | 54 | 11 | 7 |
| 440 | Series Statement, Title (Traced) | | 2 | 1 |
| 500 | General Note | 29 | 88 | 78 |
| 503 | Bibliographic History Note | | 2 | |
| 504 | Bibliography Note | | 3 | 2 |
| 505 | Formatted Contents Note | 36 | 5 | 1 |
| 506 | Restrictions on Access Note | | 6 | |
| 516 | Type of File or Data Note | 52 | 50 | 22 |
| 520 | Summary, Abstract, Annotation, Scope, etc., Note | 64 | 37 | 15 |
| 521 | Target Audience Note | | 9 | 1 |
| 530 | Additional Physical Form Available Note | 34 | 4 | |
| 535 | Location of Originals/Duplicates | | 11 | 3 |
| 538 | Technical Details Note | 45 | 82 | 64 |
| 580 | Linking Entry Complexity Note | | 1 | |
| 700 | Added Entry, Personal Name | 74 | 20 | 9 |
| 710 | Added Entry, Corporate Name | 70 | 33 | 15 |
| 711 | Added Entry, Conference or Meeting Name | | 1 | |
| 730 | Added Entry, Uniform Title | 47 | 5 | 2 |
| 740 | Added Entry, Title Traced Differently | 60 | 26 | 7 |
| 753 | Technical Details Access to Computer Files | | 8 | 2 |

**Table 17. Summary Scores for Test Collection—Variable Fields *(continued)***

| | | Score | | |
|---|---|---|---|---|
| **Field** | **Name** | **1** | **2** | **3** |
| 773 | Host Item Entry | | 1 | |
| 780 | Preceding Entry | 40 | 1 | |
| 852 | Location/Call Number | 57 | 76 | 65 |

**Table 18. Fields Occurring Once**

| Field | Name |
|---|---|
| 010 | Library of Congress Control Number |
| 036 | Original Study Number |
| 045 | Time Period of Content |
| 111 | Main Entry Heading, Conference or Meeting Name |
| 210 | Abbreviated Title |
| 222 | Key Title |
| 310 | Current Frequency |
| 350 | Subscription Price |
| 351 | Organization and Arrangement |
| 490 | Series Statement, Not Traced or Traced Differently |
| 502 | Dissertation Note |
| 510 | Citation/Reference Note |
| 522 | Geographic Coverage Note |
| 524 | Preferred Citation of Described Materials Note |
| 536 | Funding Information Note |
| 537 | Source of Data Note |
| 556 | Information about Documentation Note |
| 565 | Case File Characteristics Note |
| 573 | (not valid) |
| 582 | Related Computer Files Note |
| 583 | Actions |
| 590 | Local Note |
| 622 | (not valid) |
| 772 | Parent Record Entry |
| 776 | Additional Physical Forms Available Entry |
| 785 | Succeeding Entry |
| 787 | Nonspecific Relationship Entry |
| 800 | Series Added Entry, Personal Name/Title |
| 830 | Series Added Entry, Uniform Title |

### Interpretation of Scores

The scores obtained by automated analysis must be interpreted in light of the following overarching factors:

1. Although the participants had experience cataloging computer files, they generally lacked experience cataloging electronic files of the sort included in the experimental collection

2. Some participants lacked experience cataloging serial materials

3. The participants were unfamiliar with some of the experiment's guidelines, particularly those relating to location, access, and acquisition information, or the suggested guidelines provided inadequate direction

4. In some cases, technical problems confounded the cataloging task

Despite these limitations, the results of this experiment reflect a substantial amount of empirical data provided by competent and experienced professionals.

### Fixed Fields

With the exception of date fields, fixed-field data consists of single-character codes, thus yielding high similarity scores (score 1). However, "country," "dates," and "encoding level" exhibit low similarity scores of 60, 64, and 69, respectively. Despite the likelihood that fixed-field elements will be coded similarly, only seven of the 15 fields occurring in the test collection scored above 90 for congruence (score 2). This indicates that catalogers disagreed whether a field should be included in the record.

The "dates" field illustrates the opposite phenomenon, that is, despite high congruence among catalogers (score 2: 92), the coding of the field was relatively dissimilar (score 1: 60). This may indicate difficulty in determining dates related to computer files.

### Variable Fields—Authors and Titles

Scores for variable fields exhibit greater disparity. For score 1 (similarity), no variable field scored above 90. Two key fields, 100 (Main Entry Heading, Personal Name) and 245 (Title Statement), scored 83 and 82, respectively. All other similarity scores were below 80.

The similarity scores for the 100 and 245 fields indicate some difficulty determining or recording the authors and titles of computer files. The 245 field is the only field required to be in the bibliographic record, and this is reflected in score 2 (congruence), 97. However, for this field a frequency score of 93 (score 3) must be interpreted as lower than desired. Minimally, every record should have a title field, which may contain the file name itself (*AACR2R*, 9.1B3).

Field 100 exhibits different characteristics. Although the similarity score is relatively high (83), score 2 (congruence) and score 3 (frequency) are low: 28 and 18, respectively. Thus, when two or more catalogers recorded a personal name as a main entry heading, the similarity of the entries was high. However, score 2 (28) may indicate difficulty in determining personal names as authors. This is corroborated by score 3, frequency. Field 100 appears in only 18% of the records, indicating that this information is often lacking or difficult to identify in the information object itself.

### Notes Fields

Not surprisingly, notes fields were thought to be valuable (e.g., field 500, score 2, congruence, : 88; score 3, frequency: 78), but the contents of the fields varied greatly (e.g., field 500, score 1, similarity: 29). Much of the information provided in the 5XX fields related to subscription or acquisition information, which assumes even greater importance in an electronic, networked environment. The low similarity score may indicate the need for additional fields or subfields to record information now relegated to notes fields.

### Location and Access

Two fields could meet the need for expressing location, access, and acquisition information and thereby lessen the reliance upon free-text notes fields: 037 (Subscription Address) and 85X (Electronic Location). With format integration, filed 037 will subsume field 265 (Source for Acquisition). This field could record subscription information and instructions, which is particularly important for electronic serial publications. A new 85X field, modeled after the existing 852 field, Location/Call Number, could provide coded location and access information. (For this experiment, field 852 was used for electronic access.)

Scores for these two fields reflect the need for additional cataloging guidelines and instruction: field 037, score 1 (similarity): 29, score 2 (congruence): 28, score 3 (frequency): 11; field 852, score 1 (similarity): 57, score 2 (congruence): 76; score 3 (frequency): 54. In both instances, similarity was unsatisfactorily low, indicating difficulty in determining or recording the required data. For field 037, the low score 3 (11) may be acceptable, because this field only pertains to subscription materials, which comprised only a portion of the test collection. However, for field 85X, the score 3 (54) must be considered low; to be truly effective, all records should contain location and access information for remotely accesses electronic files. In the case of serial publications, field 85X would record the location of archived files or individual issues, if available.

## Recommendations

The findings of this project reveal aspects of electronic information objects available via the Internet, provide a taxonomy of file types available via FTP, and, through repeated application under test conditions, provide a substantive body of data on the suitability of conventional methods for providing bibliographic description and access.

Clearly, the Internet is a rapidly growing environment that facilitates and encourages the creation and dissemination of electronic information objects. As network access broadens, data storage costs drop, and bandwidth increases, the problems of discovering, accessing, and using information on the Internet will likely compound in the absence of additional information management tools and services.

Experimental methods and systems such as WAIS, Gopher, and archie begin to address the problems of network information management; continued research and development of these and other systems are warranted at this early stage of network development and deployment.

To date, remote-access electronic information objects and network information management systems are not well integrated within existing library infrastructures; the reasons for this are many, among them: lack of Internet connection, lack of awareness of electronic information, lack of value of electronic information objects, and the difficulty of locating, accessing, and using electronic information.

Libraries must continue to provide value-added services to the nation's growing body of electronic information objects, systems, and services. While aspects of this electronic information collection—mutability, lack of fixity in a medium, remote accessibility—require adjustments in procedures for cataloging description and access, they do not argue for the abandonment of existing methods. To the contrary, the value of the nation's existing infrastructure of libraries, library systems, and local, regional, and national union catalogs must be leveraged for the information needs of the future.

Libraries stand ready today to begin or continue the process of providing bibliographic control for remotely accessed information objects. The value of information on the Internet varies widely, and its usefulness is often best determined by the individual user. However, even as not all print materials are collected by all libraries, neither should all electronic files be cataloged. Experience gained as a course of this project indicates that the actual body of formal, published information is actually rather small when compared with the amount of information available.

As with print and other media, libraries can continue to provide the value-added service of selecting materials for description and access, or inclusion in a collection, whether it be local or remote and dispersed.

As a practical starting point, libraries could create bibliographic records for electronic information objects produced by the faculty of staff of their home institutions. By creating such records, complete with location and access information, libraries help assure broad awareness and access to the work products of the institution. When contributed to a searchable union catalog, these records become widely available.

As a second step, libraries could create records for materials requested and obtained on behalf of patrons, if such records do not already exist. Following the bibliometric wisdom that the best indicator of a subsequent use of an object is an initial use, libraries could contribute to a growing catalog of resources, regardless of whether the library chooses to obtain the file for local holdings.

From this reasoning and the experience gained through this project, the following recommendations are offered:

1. Implement the creation of machine-readable cataloging records (MARC) for remotely accessible electronic information objects. Proposed modifications to the USMARC

computer files format are included in Appendix A; guidelines to assist catalogers with the application of *Anglo-American Cataloguing Rules* (2d. ed., rev.) appear in Appendix B.

2. Monitor the use effectiveness of records created for providing description and access information.

3. Extend cataloging rules and formats to include interactive network systems and services.

To achieve recommendation three, further examination of the nature of electronic information systems and services is warranted.

The proposals put forward herein do not address all outstanding problems. For example, while electronic description and access are clearly needed, methods of assuring immutable location and access indicators would extend the value of bibliographic records.

## Notes

---

[1] Primary source materials initially available to project staff included Krol, E. The Hitchhikers Guide to the Internet. Network Working Group Request for Comments 1118; September 1989. 24p. (available for anonymous ftp from host nic.ddn.mil, directory rfc; filename rfc1118.txt, file size 61740 bytes); National Science Foundation Network Service Center (BBN Systems and Technologies Corporation). *Internet Resources Guide*; 1989 (available for anonymous ftp from host NNSC.NSF.NET, directory RESOURCE-GUIDE); and Quarterman, John S. *The Matrix: Computer Networks and Conferencing Systems Worldwide*. Bedford, Massachusetts: Digital Press; 1990. A now-defunct, manually maintained list of Internet FTP sites also provided intial direction. The "Request for Comments" series of documents, which forms the official Internet documentation sanctioned by the Internet Activites Board, also provided valuable initial direction.

[2] Recent publications include:. Kehoe, Brendan P. Zen and the Art of the Internet: A Beginner's Guide. Englewood Cliffs, N.J.: Prentice Hall; 1993; Krol, Ed. The Whole Internet: User's Guide & Catalog. Sebastopol, California: O'Reilly & Associates, Inc.; 1992; Marine, April, ed. Internet: Getting Started. Menlo Park, CA: SRI International; 1992.

[3] WAIS (Wide Area Information Server) is a distributed search and retrieval system using a client/server model and the draft Z39.50 standard for bibliographic retrieval. For descriptions, *see* Kahle, Brewster and Art Medlar. An Information System for Corporate Users: Wide Area Information Servers. *ONLINE* 15(5): 56–60; Lincoln, Barbara. *Wide Area Information Servers (WAIS) Bibliography*. Menlo Park, California: Thinking Machines Corp.; 1992 (available for anonymous ftp from host quake.think.com, directory pub/wais/wais-discussion; filename bibliography.txt; file size 11820 bytes); Lincoln, Barbara. Wide Area Information Servers (WAIS) Bibliography. *Information Standards Quarterly* 4(3): 13–15. Nickerson, Gord. Getting to Know Wide Area Information Servers. *Computers in Libraries* 12(9): 53–55.

[4] Gopher is a client/server protocol for distributed information systems. For descriptions, *see* Alberti, Bob [and others]. The Internet Gopher protocol: A distributed document search and retrieval protocol: University of Minnesota; Spring 1992 (available for anonymous ftp from host boombox.micro.umn.edu, directory pub/gopher/gopher_protocol; filename protocol.txt; file size 30640 bytes); The Internet Gopher: An Information Sheet. *Electronic Networking: Research, Applications and Policy* 2(1): 69–71.

[5] The archie system facilitates information discovery and access by creating a searchable database of file and directory information obtained from FTP host computers. For a description, *see* Deutsch, Peter.

Resource Discovery in an Internet Environment: The Archie Approach. *Electronic Networking: Research, Applications and Policy* 2(1): 45–51.

[6] Hytelnet provides hypertext access to lists of Internet resources and facilitates logging on to the remote resource. For a description, *see* Scott, Peter. Hytelnet as Software for Accessing the Internet: A Personal Perspective on the Development of Hytelnet. *Electronic Networking: Research, Applications and Policy* 2(1): 38–44.

[7] *See* Kovacs, Diane K. Directory of Scholarly Electronic Conferences (available on BITNET by sending the following commands to listserv@kentvm.bitnet: GET ACADLIST FILE1; GET ACADLIST FILE2; GET ACADLIST FILE3; GET ACADLIST FILE4; GET ACADLIST FILE5; GET ACADLIST FILE6. File sizes: FILE1, 68002 bytes; FILE2, 55183 bytes; FILE3, 69589 bytes; FILE4, 60077 bytes; FILE5, 46052 bytes; FILE6, 31679 bytes; INDEX, 20957 bytes; README, 9242 bytes.); and Strangelove, Michael; Kovacs, Diane. *Directory of Electronic Journals, Newsletters and Academic Discussion Lists*, 2d ed. Okerson, Ann, ed. Washington, D.C.: Association of Research Libraries; 1992.

[8] Statistics derive from various sources and represent a snapshot of network development at a particular point in time. *See* Lotter, M. Internet Growth (1981–1991). Network Working Group. Request for Comments 1296. 1992 (available from nsc.nsf.net; directory: rfc; file: rfc1296.txt; size: 20104); *see also* network statistics, provide by Merit Network, Inc., available via FTP from nic.merit.edu; directory: nsfnet/statistics; file: history.netcount; size: 2607).

[9] *See* LaQuey, Tracy L. The User's Directory of Computer Networks. Bedford, Mass.: Digital Press; 1990; Nickerson, Gord. Usenet. *Computers in Libraries* 12(4): 31–34; Nickerson, Gord. Effective Use of Usenet. *Computers in Libraries* 12(5): 38–40.

[10] Usenet traffic statistics for a two-week period in December 1992: 202,480 articles totaling 406 Mbytes (505 Mbytes, including headers) submitted to 3,941 newsgroups from 20,107 sites by 49,683 users; daily news average: 29 Mbytes (36 Mbytes, including headers). Statistical updates are available from the newsgroup news.lists or via FTP from ftp.uu.net; directory: usenet/news.lists.

[11] The Internet facilitated all administrative aspects of this experiment, including collecting and distributing files for cataloging, distributing ancillary documents, and receiving catalog records created by project participants.

## Appendix A

## Proposal 93-4

The following is a proposal concerning online information resources in USMARC. It will be considered at the Midwinter ALA meetings of the USMARC Advisory Group in Denver on January 23, 1993. Comments may be forwarded to Rebecca Guenther, Network Development and MARC Standards Office, Library of Congress, Washington, DC 20540; Internet address: rgue@seq1.loc.gov; phone: (202) 707-5092; FAX: (202) 707-6269

PROPOSAL NO: 93-4

DATE: November 20, 1992

REVISED:

NAME: Changes to the USMARC Bibliographic Format (Computer Files) to Accommodate Online Information Resources

SOURCE: OCLC Internet Resources Project and Library of Congress

SUMMARY: This proposal attempts to accommodate one category of online information resources in the USMARC format for computer files, electronic data resources (software, electronic text and data files, bibliographic databases, etc.). It proposes the following: 1) adding four codes to 008/26 (Type of computer file and changing the definition of descriptors; 3) making field 516 (Type of File or Data Note) obsolete; and 4) adding a new field 856 to the Holdings/Bibliographic formats for electronic location and access information. It does not cover online systems and services (e.g. campus wide information systems, Telnet sites, bulletin boards, etc.), although some data elements may be applicable to those.

KEYWORDS: Field 008/26 (Computer files); Field 256; Field 516; Field 856 (Holdings/Bibliographic); Type of Computer File; File Characteristics; Type of File or Data Note; Electronic Locations (Holdings/Bibliographic)

| DATES | STATUS/COMMENTS |
|---|---|
| 11/20/92 | Forwarded to the USMARC Advisory Group for discussion at the January 1993 MARBI meetings. |

## PROPOSAL NO. 93-4
## Changes to the USMARC Bibliographic Format for Computer Files to Accommodate Online Information Resources

### 1. Introduction

As librarians and other information professionals work in increasingly networked environments, the explosion of electronic information has become harder and harder to control. Many different types of online information resources are available to users over one or more networks, and it is highly desirable to provide bibliographic control to this wealth of information. Several projects are being pursued to create directories of these resources. To provide USMARC catalog records for online information resources and to share them between systems is a desirable goal.

The USMARC Advisory Group has explored the topic of accommodating online information resources in two previous discussion papers. Discussion Paper No. 49 (Dictionary of Data Elements for Online Information Resources), discussed in June 1991, presented the data elements needed for online information resources and gave a tentative mapping to USMARC bibliographic fields. Participants agreed that USMARC should be expanded to accommodate description and access of machines as resources on the network as well as data files on the machines, and that further work on the data elements and USMARC mapping needed to be done. Discussion Paper No. 54 (Providing Access to Online Information Resources) introduced questions of scope and the use of fields in the USMARC Holdings Format and the new Community Information Format (provisionally approved during Midwinter 1992 ALA). It was agreed that electronic data resources might be more amenable than online systems and services to bibliographic description using AACR2 computer files cataloging rules and the USMARC bibliographic format as they now exist, and that more work needs to be done to accommodate online systems and services. Examples of those falling into the category of electronic data resources are: electronic text, software, data files, bibliographic databases, electronic graphics files. Examples of online systems and services are: FTP sites, Telnet sites, listservs, bulletin boards, campuswide information systems. (Some types of resources may not clearly belong in one or the other category, but have features of both.)

As part of its Internet Resources Project, OCLC has been investigating the nature of electronic information available via the Internet. It hosted a meeting in April 1992 with representatives from OCLC, Online Audiovisual catalogers (OLAC), Library of Congress, and MARBI (referred to here as the Internet Resources Cataloging Experiment Advisory Committee) to review work on the project, examine sample documents collected, and plan a cataloging experiment of Internet resources. The experiment was intended to test and verify the applicability of the cataloging rules and the USMARC format for computer files, and provide sufficient data to determine what changes need to be made to AACR2 and USMARC to accommodate these materials.

The cataloging experiment was held during May and June 1992 and involved the cataloging of 300 computer files collected from Internet sites, half of which were all types of electronic texts, and the other half randomly-selected text, software and data. Each file was cataloged by three different catalogers. After a call for participation was issued and distributed electronically via the Internet, a group of catalogers was selected to participate and given instructions for cataloging. The catalogers were requested to keep a log file for each item cataloged to record problems or comments as well as the amount of time it took them to catalog the items.

Results of the experiment indicate that the USMARC format generally accommodates the description of Internet resources, but that clear guidelines need to be developed to assist catalogers. These guidelines are needed both for AACR2 cataloging rules and the USMARC format. Particular problem areas identified in the experiment were: need for more codes in 008/26 (Type of computer file); guidelines for the appropriate and consistent use of note fields; need for more specific descriptors of the type of file or resource; definitions for what constitutes a published item (which can be questionable when considering data resources on the Internet); specifications for including location and access information to find and retrieve the item.

This proposal attempts to compensate for these deficiencies in the USMARC bibliographic format, computer files specifications. It is intended to accommodate those types of resources previously described as "electronic data resources." Of particular interest is the electronic journal or newletter, because of the phenomenal increase in the number being issued. Although some of the data elements (particularly those for location and access) may be applicable to the second category of "online systems and services," the latter will be more fully covered at a later date.

## II. Types of Computer Files

The cataloging experiment and OCLC's exploration of Internet resources revealed that the list of computer file types in 008/26 did not cover all that were needed to make this data element useful. The relationship between 008/26, 256 (File Characteristics) and 516 (Type of File or Data Note) was explored by the Internet Resources Cataloging Experiment Advisory Committee to determine solutions. It was decided that several steps need to be taken to adequately describe types of computer files and make this information useful for identification and retrieval.

A. Add four codes to 008/26. The cataloging experiment revealed that in many cases where the catalogers were unsure how to code in this character position, they used either combined (m) or Other (z). Since users may wish to retrieve on this code, more specific codes are needed. However, the group felt that a fairly short list of types should be available here, with more specificity elsewhere in the record. Those types that are not adequately described by the current list in 008/26 have been identified as: bibliographic data, font, game and sounds. With the exception of bibliographic data, these types of computer files would most likely all be coded now as either program or combination. In

the case of bibliographic data, this is intended to satisfy the need to describe bibliographic data, particularly for library catalogs; none of the available codes are appropriate. It was felt that it would be more useful to tell the user up front if a file was one of these types, since it may be desirable to limit searches more effectively, that these are very specific types of resources with specific uses and requirements, and that they are of special interest to libraries. Since more than one of the codes may be applicable for an item, guidelines for coding should specify to code for the most specific code available. For instance, games are computer programs, but the Committee chose to identify them separately, because they are used for a specific purpose. Users who may wish to retrieve games would want only games, and not have to sift through other programs. The 008/26 field is used for retrieval of specific types of computer files, and those with a specific code of particular interest to libraries.

B. Change the definitions for three codes. It was felt that in the current electronic world, the term "graphic" would better describe what USMARC has used as "representational" (code c). In addition, the word "text" is confusing because many electronic files include text (instructions for software, etc.). The term "document" would limit the use of this code to textual material that is intended to constitute a document, whether represented as ASCII or image data. The intent of the file (as document, rather than graphic) should be expressed in the code. In addition, it is proposed that "numeric" be changed to "numeric data", so that it parallels the use of the new code "bibliographic data."

C. Broaden the type descriptors in field 256. According to current cataloging rules and practice, field 256 (File Characteristics) is used as a collation field for computer files and includes a statement of the type of file. However, only "computer data," "computer program" or "computer data and program" has been used in this field (followed by additional file characteristics), limiting its usefulness in description of a type of file. The Committee agreed that the statement of type in this field should include the specific type, which has generally been recorded in field 516 (Type of File or Data Note). A list of descriptors should be included in the field as guidance to users, although this should not be a closed list. Currently, AACR2 specifies using two types in this field (currently data and programs), and this practice could be continued with two types of more specific descriptors. Field 256 also includes file size. However, in cases where file size is dependent on how the file has been stored (e.g., in a compressed form or not), different file sizes recorded in field 256 could force separate records for the different files. Consequently, the Committee decided that information on file size should be included in the new electronic location field (see below).

It is important to remember that the purpose of field 256 is identification, not access. The group felt that the limitation to data and/or program in this field limits its usefulness for identification purposes, and that an expansion of the descriptors would be useful. A nature and scope note (field 500) or abstract (field 520) may be used for more specific description of the resource than this field provides. Access to descriptors of the resource is provided in the 65X fields.

Examples of the use of field 256 includes: an item coded as "d" ("document") in 008/26 might include "electronic newsletter" or "electronic book" in field 256; an item coded as "b" ("computer program") in 008/26 might include "executable software" or "source code" in field 256. See Attachment B for examples and comparisons of these two fields.

Changes to field 256 require changes to the *Anglo-American Cataloging Rules*, second edition, so that information other than that identified above can be recorded as File Characteristics. What is being proposed for 008/26 and 256 is being coordinated simultaneously with the ALA Committee for Cataloging: Description and Access (CC:DA) process.

D. Make Field 516 obsolete. It is proposed that field 516 be made obsolete. In discussions of this issue, the Committee found that it was difficult to distinguish between 516 data and that which is considered "nature and scope" (as defined in AACR2 rule 9.7B1a), which for all other types of materials is recorded in the general note field 500. Field 516 was not made obsolete with the format integration proposal, because at the time 256 data was limited as described above to "computer data," "computer program," etc., and it was desirable to separately identify the type of file in a specific tag. However, if 256 can be used more broadly, the type of file or data can be separately identified.

## III. Electronic Location and Access

Because of the nature of electronic information and its availability, it is necessary to provide information on location and access. An electronic data resource can reside in many directories at any number of hosts in several formats. It might be stored as a compressed file and an uncompressed file with different filenames, yet the end result is the same item. During the initial planning of the OCLC cataloging experiment, participants felt that the capability of machine access to the item should be provided for those items that are self-identifying (i.e., do not require interactive searching). All data elements that a user needs to know to make the connection, locate the document and retrieve it (in the case of files) should be included in the catalog record. In the case of library catalogs or other databases, the information needed to connect should be given, although only site-specific information about the server to which one is connecting (information that everyone would need to know) is included. Information that might be needed about the client (i.e., the system from which the connection is made) is not given, and must be dealt with locally. Data elements should be parsed and transportable between systems and formats. It was felt that location data in the USMARC format properly belongs in a holdings and locations field (85X block), which according to the standard can be embedded in a bibliographic record.

The content of this field was developed with Internet resources specifically in mind, as an outgrowth of the OCLC Internet Resources Project cataloging experiment. However, it is expected that the field can be extended to non-Internet resources (e.g., BBSs, dial-up access to Compuserve, etc.). Consideration will be given to online systems and services

and a proposal to accommodate these considered in the near future. At that time, non-Internet resources that are found to be of high interest to libraries will be tested.

Working groups of the Internet Engineering Task Force have been actively pursuing the establishment of a standardized way of encoding a pointer to a resource for any system (the Universal Resource Locator, or URL) and standardized ways of identifying resources (the Uniform Resource Identifier and Uniform Resource Number--names of these have changed and are current as of November 1992). The Uniform Resource Number is roughly equivalent to an ISBN for a networked resource. The definition of a Uniform Resource Identifier is still under discussion. Once the IETP standards are developed and implemented, it will be necessary to include fields in the USMARC format for some or all of these data elements.

The volatility of the electronic location may be a problem if this data is included in a USMARC record. The content designators that follow are being proposed to allow for electronic location and access information to be carried in a USMARC record. At the point when the IETF completes its work in developing a Universal Resource Locator and its implementation is possible, including approporiate links to USMARC systems, this field may no longer be needed. The work of the IETF promises a solution more useful than that being proposed in this paper. However, in the meantime, the data is needed in the USMARC record for electronic resources, even if it is less than a perfect solution. It is expected that the kinds of resources for which USMARC cataloging will be done will likely be less volatile than much of what exists on the Internet as a whole.

**Content designators.** A new field 856 (Electronic Location and Access) could be defined. The following data elements with proposed subfield codes were identified as necessary to provide adequate location and access information for the machine to connect to the host and transfer the file (if appropriate):

Indicator 1 - Access method
0 Email
1 FTP
2 Remote login (Telnet)
8 Other

The values defined are the main TCP/IP protocols. This indicator defines how the rest of the data in the field will be used. If the resource is available by more than one method, the field is repeated with data appropriate to each method. "Subscribe" (for electronic journals available through Listserv software) would fall under Email. Value 8 is provided and would require the use of a subfield $2 to identify another access method. Given the availability of electronic information through other methods such as WAIS, Gopher, etc. (which currently require using Telnet, but this may change in the future) and whatever else might come in the future, it is desirable to allow for other methods. At this point those listed above will give adequate information for the system to make the machine connection to allow for access to the file.

$a - Host name (R) e.g. harvarda.harvard.edu; harvarda.bitnet

Includes the Internet address (Fully Qualified Domain Name). For a Bitnet address, use of ".bitnet" could be a convention to identify the network, in case a gateway needs to be added by the computer. This subfield could be repeated if it has an Internet and Bitnet address if all the rest of the information in the field applies.

$b - IP address (R) e.g. 141.212.196.79

Because the IP (Internet Protocol) address can change frequently (even within a session), it has been recommended by members of the Internet Engineering Task Force that a field should be provided, but that data should not be statically stored. Rather, it could be generated by the system on demand.

$c - Compression information (NR) e.g., Use PKUNZIP to decompress

Many files reside on the Internet in compressed form. The compression information is specific to a certain file. The software required to decompress the file could be identified here. Certain file extensions may indicate the type of compression used. This field is not repeatable, since the filename would be different if a different type of compression is used, thus requiring a repeated 856 field.

$d - Path (R). e.g. wais/doc; aii/admin/games

This subfield is only repeated if the rest of the information in the field (particularly filename) applies to the file as stored in different directories. The path is specific to the operating system specified in $o.

$f - Filename (R) e.g. dutils2.sit; stats.c.Z

This subfield is used to show the filename on the host machine in the directory stated in $d. If the file is stored with different filenames, it would generally require repetition of the field. However, in the case of having one document divided into two files, it may be repeated, provided the multiple filenames constitute one intellectual item. A wildcard (.*) could be used in this subfield to show that the filename varies for an operating system that allows this. (Then a subfield $z note could explain how files are named.) Filename may be case-sensitive for some systems.

$g - Name of publication or conference (NR). e.g. AN2

This may be used when the first indicator is set to 0 (Email) for "subscribe". It is usually the title or a variant of the title in field 245.

$h - Processor of request (NR) e.g. listserv, mailserver

This includes the username, the data preceding the "@" in a subscription request.

$i - Instruction (R) e.g. get; subscribe

This would be used with first indicator value 0 (Email). It is an instruction for the remote host to process.

$k - Password (NR) e.g. guest

Often FTP sites require the user to enter an Internet address. For library catalogs a password may be required. If it does not matter what is entered, the subfield would not be used. This should be used only for general use passwords, not for any requiring security.

$l - Logon/login (NR) e.g. anonymous

For anonymous FTP, the logon is usually "anonymous." For library catalogs, it may be specific names. Other unique logons will be used for online systems and services (not covered in this proposal, but to be considered later). An account number required for login may also be indicated. As with password, this should be used for general use login, not for any requiring security.

$m - Contact person for information, assistance (R)

This information might also be included in field 037 (Source of Acquisition after format integration) if at the record level. It is included here if it is applicable only at a particular location. At the time when USMARC deals with online systems and services, other data elements or fields will need to be considered for contact people, addresses, etc.

$n - Name of location of host in $a (R) e.g. University of Michigan

This is the textual form of the name of host that appears in subfield $a and identifies it geographically.

$o - Operating system (NR) e.g. VM, Unix

For informational purposes operating system for the host name specified in $a is indicated here. Conventions for path and filenames may be dependent on the operating system. For operating system required at the record level rather than at a particular location, field 753 (Technical Details Access to Computer Files), subfield $c (Operating system) is used.

$p - Port (NR) e.g. 3000 (used with madlab.sprl.umich.edu)

There are some cases where a port needs to be specified to make a connection.

$q - File Mode (NR) e.g. binary, ascII, tenex.

This is essential information for transferring a file. It is non-repeatable, because if more than one apply, separate 856 fields would be required to include different filenames (and perhaps directories). Perhaps ASCII should be the default, and this subfield used if another needs to be specified, e.g. binary.

$s - File Size (R) e.g. 88916 bytes

File size is given for informational purposes, since it is related to the size of the file as it is stored under the filename identified in subfield $f at the location in subfield $a. Since files may be stored in a compressed format, file size may vary, although the record may represent only one intellectual item. It was considered desirable not to force a separate record when file size varies; instead of recording it in field 256 (File Characteristics), it would be related to the filename in field 856.

$t - Terminal emulation (R) e.g. vt100, 3270

This is used when the type of terminal emulation must be specified for remote login (value 2 in first indicator).

$x - Non-public note (R) e.g., cannot verify compression information

This might be reserved for non-public notes, perhaps for processing purposes.

$z - Public note (R)

This could be used for general instructions for use. Also included could be connection information in textual form (e.g., special logoff instructions).

$2 - Source of access (R)

If the source shown in Indicator 1 is "Other", this subfield could be defined to specify. It may be desirable to control this list at some point.

**Guidelines.** Field 856 is a holdings/bibliographic field pertaining to a particular location of an item. For description of the universal item (that which applies to the item regardless of location and copy) the bibliographic fields are used. For instance, in the case of electronic data resources, technical requirements for using the resource will be recorded in field 538 (Technical Details Note) if it applies to the universal item regardless of the way the file has been stored at a particular location. Computer files may be compressed with a different filename than the uncompressed file, and both may be available at the same (or different) locations. In this case two 856 fields would be given with different filenames. Also possible might be a case where the document is broken into multiple files. Often this is done because some systems cannot handle the transfer of very lengthy files. In this case, there is a single intellectual work with different filenames, all at the same location. This document may be at two locations, one

which stores it as a single file, and the other as multiple files. One 856 field is given for each location, with repeatable subfields $f (this is the only case where multiple filenames do not require a separate 856 field).

The value in the first indicator often determines which subfields might be used. For instance, an electronic journal which uses electronic mail for subscriptions might require the use of (among others) subfields $g (Name of publication or conference), $h (Processor of request), and $i (Instruction). A file available through FTP may require the use of (among others) subfields $c (Compression information), $d (Path), $f (Filename), $k (Password), $l (Logon), $q (File mode), $s (File size). A library catalog record might require the use of (among others) subfields $k (Password), $l (Logon), $m (Contact person), $t (Terminal emulation).

## IV. Format Integration Considerations

This proposal assumes format integration as detailed in the document Format Integration and its Effect on the USMARC Bibliographic Format. Leader/06 would be coded for form aspects and not control aspects, with Leader/07 indicating control aspects. Thus, an electronic journal would be coded as a computer file in Leader/07, with its seriality indicated in Leader/07. Its 008 would reflect its existence as a computer file, and field 006 is used for seriality aspects, as defined in the format integration document. See also Proposal No. 93-1 (Make Computer Files 008/18-19 Obsolete in the Bibliographic Format).

## V. PROPOSED CHANGE

The following is presented for consideration:

In the USMARC Bibliographic Format, add the following codes in 008/26:

- e bibliographic data
- f font
- g game
- h sounds

Change the definition of the following codes:

- a numeric data (currently numeric)
- c graphic (currently representational)
- d document (currently text)

See Attachment A for description of this field if this proposal is approved.

In the USMARC Bibliographic Format, in field 256 (File Characteristics) allow for specific descriptors to be used, with a list of examples.

Make field 516 (Type of File or Data Note) in the USMARC Bibliographic Format obsolete.

See Attachment B for a comparison of terms in fields 008/26 and 256.

In the USMARC Holdings/Bibliographic Formats, define field 856 (Electronic Location and Access).

See Attachment C for a description of this field if this proposal is approved.

See Attachment D for examples.

## Attachment A

Note: [ ] indicates deletion; < > indicates addition.

| | | Format/NLR | | |
|---|---|---|---|---|
| | | BK | AM | CF |
| MP MU VM SE | | | | |
| 008/26 | TYPE OF COMPUTER FILE | | | M |
| Codes | | | | |
| a | Numeric <data> | | | A |
| b | Computer programs | | | A |
| c | [Representational] <Graphic> | | | A |
| d | [Text] <Document> | | | A |
| <e | Bibliographic data | | | A> |
| <f | Font | | | A> |
| <h | Game | | | A> |
| m | Combination | | | A |
| <s | Sounds | | | A> |
| u | Unknown | | | A |
| z | Other | | | A |

### Character Position Definition and Scope

A one-character alphabetic code indicates the type of computer file being described. The <specific> type of file is also described in textual form in field <256 (File Characteristics)> [516 (Type of File or Data Note)].

### Guidelines for Applying Content Designators

**Codes.**

a - Numeric <data>

Code *a* indicates a file that contains mostly numbers or representation by numbers, such as records containing all information on student test scores, all information on football team statistics, etc. The information may be original surveys and/or information that has been summarized or statistically manipulated.

| | |
|---|---|
| 008/26 | a |
| [516] <256> | $aNumeric <data>[(Summary statistics)] |
| <500 | $a Summary statistics> |

b - Computer program

Code *b* indicates a file containing an ordered set of instructions directing the computer to perform basic operations and identifying the information and mechanisms required. This category includes [videogame and] microcomputer software and computer models.

| | |
|---|---|
| 008/26 | b |
| [516] <256> | $aComputer programs |

c - [Representational] <Graphic>

Code *c* indicates a file that contains pictorial or graphic information that can be manipulated in conjunction with other types of files to produce graphic patterns that can be used to interpret and give meaning to the information. It does not include a document in image format.

| | |
|---|---|
| 008/26 | c |
| [516] <256> | $aGraphic [data (Architectural drawings)] |
| [500 | $a Architectural drawings |

d - [Text] <Document>

Code *d* indicates a file that contains mostly alphabetic information (words or sentences) converted into a coded format that can be processed, sorted, and manipulated by machine, and then retrieved in many optional formats. This category includes such information as [bibliographic files and] records containing full text of documents. <It includes language material intended to constitute a textual document, whether represented as ASCII or image data.>

| | |
|---|---|
| 008/26 | d |
| [516] <256> | $a<Electronic> Text [(Law reports and digests)] |
| <500 | $a Law reports and digests> |

<e - Bibliographic data

Code *e* indicates that the item consists of data with bibliographic citations. This includes library catalogs or citation databases. The data may be in a structured or unstructured form.

| | |
|---|---|
| 008/26 | e |
| 256 | $Library catalog> |

<f - Font

Code *f* indicates a file contains information for a computer to produce fonts.>

<g - Game

Code g indicates that a file is a game, intended for recreational or educational use. Generally games consist of text and software. A videogame is included here.

```
008/26          g
256             $aComputer game>
```

h - Sounds

Code *h* indicates that the file contains actual sounds produced by the computer. These are binary files of digitally sampled sounds which require specialized hardware to convert the digital signal to analog.

m - Combination

Code *m* is used when the item is a combination of two or more of the above types of files.

```
008/26          m
[516] <256>     $aComputer programs and text files
```

u - Unknown

Code *u* indicates that the type of file is unknown.

```
008/26          u
```

z - Other

Code *z* indicates a type of file for which none of the other defined codes are appropriate. <Databases that are neither numeric nor bibliographic are coded here.>

```
[008/26             z
516             $Audio data (Digital audio file)]

<008/26             z
256             Nonbibliographic database>
```

### <Input Conventions

If more than one code applies, code for the most specific one available.
In cases of a combination of files, code for the predominant one; if none is predominant, code as combination (code m).>

**Related USMARC Document/Field**

<256 File Characteristics>
[[516] Type of File or Data Note]

**Attachment B**

Examples of descriptors used in 008/26 and 256

| 008/26 | 256 |
|---|---|
| a numeric data | census data<br>survey data |
| b computer program | utility program<br>executable software<br>source code |
| c graphic (change from representational) | graphic |
| d document | electronic document<br>electronic journal<br>electronic newsletter<br>electronic text |
| e bibliographic data | library catalog<br>citation database<br>bibliographic database |
| f font | computer font |
| g game | computer game |
| h sounds | computer sounds |
| m combination | computer data and programs, or combine any terms used in 256, e.g.: computer font and text |

## Attachment C

856 Electronic Location and Access

**Indicators**

First Access method
- 0 Email
- 1 FTP
- 2 Remote login (Telnet)
- 8 Other

Second Undefined
- # Undefined

**Subfield Codes**

$a - Host name (R)
$b - IP address (NR)
$c - Compression information (NR)
$d - Path (R)
$f - Filename (R)
$g - Name of publication or conference (NR)
$h - Processor of request (NR)
$i - Instruction (R)
$k - Password (NR)
$l - Logon/login (NR)
$m - Contact person for information, assistance (R)
$n - Name of location of host in $a (NR)
$p - Port (NR)
$q - File mode (NR)
$s - File size (R)
$t - Terminal emulation (R)
$x - Non-public note (R)
$z - Public note (R)
$2 - Source of access (NR)

### Field Definition and Scope

This field contains the information required to locate an electronic item. The information identifies the electronic location containing the item or from which it is available. It also contains information to retrieve the item by the access method identified in the first indicator. The information contained in this field is sufficient to allow for the electronic transfer of a file, subscription to an electronic journal, or logon to a library catalog.

Field 856 is repeated when the location data elements vary (subfields $a, $b, $d) and when more than one access method may be used. It is also repeated whenever the filenames vary, except for the situation when a single intellectual item is divided into different parts for online storage or retrieval.

## Guidelines for Applying Content Designators

### Indicators

First Indicator - Access method

The first indicator position contains a value that defines how the rest of the data in the field will be used. If the resource is available by more than one method, the field is repeated with data appropriate to each method. The methods defined are the main TCP/IP protocols.

0 - Email

Value *0* indicates that access to the electronic resource is through email. This includes subscribing to an electronic journal or electronic forum through software intended to be used by an email system.

1 - FTP (File Transfer Protocol)

Value *1* indicates that access to the electronic resource is through the File Transfer Protocol (FTP). Additional information in subfields of the record may enable the user to transfer the resource electronically.

2 - Remote login (Telnet)

Value *2* indicates that access to the electronic resource is through remote login (Telnet). Additional information in subfields of the record may enable the user to connect to the resource electronically.

8 - Other

Value *8* indicates that access to the electronic resource is through a method other than the defined values. The specific access method is specified in subfield $2 (Source of access).

Second Indicator - Undefined

The second indicator position is undefined and contains a blank (#).

### Subfield Codes

$a - Host name

Subfield $a contains the host name of the electronic location. It contains a network address which is repeated if there is more than one address for the same host.

856 1 $a harvarda.harvard.edu $a harvarda.bitnet

$b - IP address

Subfield $b contains the Internet Protocol (IP) numeric address associated with a host. This data changes frequently and should be generated by the system, rather than statically stored.

856 2 $a anthrax.micro.umn.edu $b 128.101.95.23

$c - Compression information

Subfield $c contains information about the compression of a file. If a specific program is required to decompress the file, it is noted here. The filename in $f may indicate the type of compression by its extension (portion after the "." or first space).

856 1 $a maine.maine.edu $c Must be decompressed with PKUNZIP $f resource.zip

$d - Path

Subfield $d contains the path with directory names where the file is stored. Directories are separated by slashes (/). This information is specific to the operating system indicated in subfield $o.

856 1 $a wuarchive.wustl.edu $d /aii/admin/CAT.games $f mac-qubic.22.hqx

$f - Filename

Subfield $f contains the filename as it exists in the directory indicated in $d, on the host machine in $a. It may be repeated only if a single logical file has been divided into parts and stored under different names, but that together constitute a single intellectual item. In all other cases, A file that may be retrieved under different filenames contains two 856 fields in the record, each with a different $f. A filename may include wildcard characters (*) if applicable (with a subfield $z note explaining how files are named). A filename may be case sensitive for some systems.

856 1 $a wuarchive.wustl.edu $d mirrors/info-mac/util $f color-system-icons.hqx
856 0 $a kentvm.bitnet $f acadlist file1 $f acadlist file2 $f acadlist file3

**$g - Name of publication or conference**

Subfield $g contains the name of the electronic publication or conference.

856 0 $a uicvm.bitnet $g ALCTS

**$h - Processor of request**

Subfield $h contains the username, or processor of the request, generally the data which precedes the "@" in the host address.

856 0 $a uicvm.bitnet $g ALCTS $h Listserv

$i - Instruction

Subfield $i contains an instruction or command needed for the remote host to process a request.

856 0 $a uccvma.bitnet $g IR-L $h Listserv $i subscribe

$k - Password

Subfield $k contains the password required to access the resource. An FTP site may require the user to enter an Internet address or may require a specific password, or a library catalog may require a password. If a password is required but anything may be used, this subfield need not be used. This should be used for general use passwords, not for any requiring security.

856 1 $a harvarda.harvard.edu $k guest

$l - Logon/login

Subfield $l contains characters needed to logon to a library catalog or FTP site. Often with anonymous file transfer the logon is "anonymous". An account number required for login may also be indicated. This should be used for general use logins, not for any requiring security.

856 1 $a unmvm.bitnet $l anonymous

$m - Contact person for information, assistance

Subfield $m contains the name of a contact person for the resource at the host specified in $a.

856 2 $a gopac.berkeley.edu $m Roy Tennant

$n - Name of location of host in $a

Subfield $n contains the full name of the location of the host in $a.

856 2 $a pucc.princeton.edu $n Princeton University

$o - Operating system

For informational purposes operating system for the host name specified in $a is indicated here. Conventions for path and filenames may be dependent on the operating system. For operating system required at the record level rather than at a particular location, field 753 (Technical Details Access to Computer Files), subfield $c (Operating system) is used.

856 1 $a seq1.loc.gov $ /pub/soviet.archive $n Library of Congress $o UNIX

$p - Port

Subfield $p contains the portion of the address that identifies a process or service in the host.

856 2 $a madlab.sprl.umich.edu $n University of Michigan Weather Underground $p 3000

$q - File mode

Subfield $q contains the file mode, which determines how it is transferred through the network. A normal ASCII file contains certain characters which are translated between systems to make the text files more readable. A file with non-ASCII characters must be transferred using another file mode.

856 1 $a archive.cis.ohio-state.edu $d pub/comp.sources.Unix/volume 10 $f comobj.lisp.10.Z $q binary

$s - File size

Subfield $s contains the size of the file as stored under the filename indicated in subfield $f. It is generally expressed in terms of bytes. It may be repeated in cases where the filename is repeated, and is recorded directly following the subfield $f to which it applies. This information would not be given for an electronic journal, since one would not indicate size of particular issues.

856 1 $a wuarchive.wustl.edu $d mirrors/info-mac/util $f color-system-icons.hqx $s 16874 bytes
856 0 $a kentvm.bitnet $f acadlist file1 $s 34,989 bytes $f acadlist file2 $s 32,876 bytes $f acadlist file3 $s 23,987 bytes

$t - Terminal emulation

Subfield $t contains the terminal emulation supported when necessary to specify for remote login (first indicator contains value 2 (Remote login (Telnet)).

856 2 $a maine.maine.edu $n University of Maine $t 3270

$x - Non-public note

Subfield $x contains a note relating to the electronic location of the resource identified in the field. The note is written in a form that is not adequate for public display, or contains processing information about the file at the location specified.

856 1 $a wuarchive.wustl.edu $c decompress with PKUNZIP.exe $d /mirrors2/win3/games $f atmoids.zip $x cannot verify because of transfer difficulty

$z - Public note

Subfield $z contains a note relating to the electronic location of the resource identified in the field. The note is written in a form that is adequate for public display.

$2 - Source of access (NR)

Subfield $2 contains the source of access when the first indicator value is set to 8 (Other). This may include access methods other than the three main TCP/IP protocols specified in the first indicator.

## Attachment D

## Examples

1. An electronic newsletter. To subscribe you have to send email to Christian Bossonious at Cornell (cri@cornellc.cit.cornell.edu).

008/26 d
256 electronic newletter
856 0 $a cornellc.cit.cornell.edu $g ACQNET $h cri $i subscribe $m Christian Bossonious $n Cornell University, Ithaca, NY $z Must send subscription request via e-mail.

2. A text document available for ftp.

008/26 d
256 electronic document (1 file)
856 1 $a um.cc.umich.edu $d /easi $f ADA.FACTS.1 $s 47,380 bytes $n University of Michigan

3. A file available from the USMARC-L listserv. Available by sending an email request to the list, specifying the file desired.

008/26 d
256 electronic document (1 file)
856 0 $a maine.maine.edu $f DP54 doc $s 31,021 bytes $h listserv $i get $m Marilyn Lutz $n University of Maine

4. A computer game, which is available by FTP and must be transferred in binary mode.

008/26 g
256 computer game (1 file)
856 1 $a wuarchive.wust1.edu $d /mirrors3/archive.umich.edu/atari/games $f monopoly.arc $s 83,694 bytes $q binary

5. A library catalog, available by remote login. (Title of resource is GLADIS.)

008/26 e
256 Library catalog
856 2 $a gopac.berkeley.edu $m Roy Tennant, rtennant@library.berkeley.edu $n UC Berkeley Online Catalog $z No password required for access $z Information present for signing on/off

## Appendix B

## Guidelines for Bibliographic Description of Internet Resources

DRAFT November 1992

These draft cataloging guidelines have been prepared for submittal to the American Library Association (ALA) Committee on Cataloging: Description and Access (CC:DA). Publication of these guidelines as part of this report to the U.S. Department of Education does not constitute their adoption or implementation by OCLC or any standards or rule-making body.

### Scope and Definition

These draft/interim guidelines are for OCLC users who are preparing bibliographic descriptions of items from the Internet. They follow the 1988 revision of the *Anglo-American Cataloguing Rules*, 2d edition (*AACR2*).

Chapter 9 of *AACR2* includes special provisions for cataloging computer files available by "remote access." Remote access is defined in *AACR2* as "The use of computer files via input/output devices connected electronically to a computer." This is contrasted to direct access, "The use of computer files via carriers (e.g., disks, cassettes, cartridges) designed to be inserted into a computer or its auxiliary equipment by the user."

These special provisions are applicable to Internet resources. They include the use of area 3 for file description, the absence of area 5 (physical description), and a note stating the "mode of access" to the file.

It is anticipated that OCLC users will work with these guidelines, understanding they are still experimental. After users have some experience with the guidelines, formal requests for any rule revisions necessary will be proposed to the Joint Steering Committee for the Revision of AACR through the ALA Committee on Cataloging: Description and Access.

These guidelines include MARC coding and tagging instructions as well as guidance for preparing the content of the bibliographic record. They also include some directions for cataloging of serial computer files.

## Are Internet Resources Published?

One question that arises with Internet resources is that of publication. Are these materials published or unpublished? Electronic journals to which one subscribes may be considered published; "issues" are distributed electronically to a formal mailing list. This follows the standard definition of publication, the distribution of multiple copies by sale or other transfer. Electronic serials may or may not carry formal publication information, but they are published.

Material other than serials to which one may subscribe may be put into the Internet by any person or agency. This material is similar to manuscript material; it is unpublished. The person accessing it makes a copy or copies for personal use as desired.

However, if the item being cataloged carries a formal statement of publication that is similar to the statement found on the title page of a book, these guidelines suggest that the cataloger should use such a formal statement found as evidence of publication and transcribe it as such. If no formal statement is found, treat the material as unpublished.

## Access Information for Internet Resources

Some information is to be carried in special MARC fields rather than as content in the traditional bibliographic record. Subscription and local access information are to be entered in field 856, a field that is being developed for this kind of information.

## The Bibliographic Description

### Chief Source of Information

The chief source of information for computer files available by remote access is the title screen or other information that displays on the terminal or on a printout. If there is no special display, information is to be taken from the file itself. If there is no title screen or information given in the file, the cataloger must supply needed information from whatever is available.

### Prescribed Sources of Information

Information for each area of the bibliographic record is to be taken from the chief source, as outlined above.

## Area 1. Title proper and statement of responsibility area [MARC field 245]

### Title proper [MARC field 245 $a]:

The title of Internet files is taken from the file itself, whether a formal title screen, the first display of information, the header to the file, or elsewhere in the file. The filename is used only if no other title is available (rule 9.1B3) and only if the cataloger cannot supply a useful title. The source of the title always is given in a note.

The title proper is the only part of the bibliographic record that always must be present. It is bracketed only if supplied by the cataloger.

**Examples:**

Texhax digest
[Bibliography on evolution and genetics]
The Jargon file

### General material designation [MARC field 245 $h]:

The only general material designation (GMD) permitted for material cataloged by AACR 2 chapter 9 is "computer file." The GMD is optional. If a GMD is used, it follows immediately after the title proper.

**Example:**

Guidelines to use 8-bit character codes [computer file]

### Other title information [MARC field 245 $b]:

Other title information, if present, follows the GMD.

**Examples:**

: [part H through L]
: part 1 of 7
: H.R. 656
: a guide to selected sources

### Statement of responsibility [MARC field 245 $c]:

A statement of responsibility is given in the title and statement of responsibility area only if a formal statement of responsibility is shown with the title (as on the title page of a "normal" book). If there is no statement of responsibility, do not attempt to construct one. A statement of responsibility is not required in a bibliographic record. People or corporate bodies named somewhere other than in a formal presentation on a "title page" may be named in a note.

The statement of responsibility information is transcribed exactly as found.

**Examples:**

/ Martha Flanders, Stephen I. Helms Tillery, and John F. Soechting
/ brought to you by Amnesty International, Potsdam Chapter
/ written by Peter Deutsch ; additional material was provided by Alan Emtage ;
David Homes prepared the illustrations
/ IETF Networking Group
/ A. Pirard

### Area 2. Edition area [MARC field 250]

The edition area contains, as an edition statement, any word or phrase indicating the information was available previously in a different form. In case of doubt, assume the information in question to be an edition statement.

**Examples:**

New version
Version 32
Version 2.9.6
Working draft
Release 12/91

### Area 3. File characteristics area [MARC field 256]

Area 3 is used for file characteristics. There are two parts to the area: the designation, and the number of records, statements, etc.

**Designation:**

This part of area 3 is required for files available by remote access.

The designation is limited to the following terms in *AACR2*:

Computer data
Computer program(s)
Computer data and program(s)

For purposes of these guidelines, the list has been expanded. It is recognized that this information is similar to the specific material designation in the "extent of item" part of area 5. As such, it should be open-ended as are the lists in most chapters of AACR 2. This will allow for the development of new materials or for the cataloging of forms not yet covered. It is suggested that the following list be used. Suggestions will be welcomed for additional terms to be added during the formal rule revision process.

Computer data
Numeric data
Census data
Survey data
Computer program
Utility program
Executable software
Source code
Computer Graphic
Electronic document
Electronic text
Electronic newsletter
Electronic journal
Computer font
Computer game
Computer sounds
Bibliographic database
Library catalog
Citation database

Computer data and program(s)
[any two terms from the list above]

A more specific list of codes, with their definitions, has been developed for MARC field 008 byte 26.

If more than two terms from the list apply, use a more general term that covers the item, because this area is required.

### Number of records, statements, etc.:

These guidelines recommend this part of area 3 not be used for the cataloging of most Internet resources, because the number of files and the file size of a document may vary greatly from the form in which it is received to the form in which it is used and stored.

## Area 3. Numeric and/or alphabetic, chronological, or other designation area [MARC field 362]

This area 3 is used for serials when cataloging with the first issue "in hand." It is used in addition to the area 3 for file characteristics and is given following that use of area 3.

**Example:**

Vol. 1, issue 1 (Oct. 1989)-

The area is omitted if cataloging is done from an issue other than the first.

## Area 4. Publication, distribution, etc., area. [MARC field 260]

### Unpublished material:

The only information for area 4 for unpublished material is the date the item was written. A date must be given. If no date appears on the item, make an assumption and enclose the assumed date in brackets [MARC field 260 $c]

**Examples:**

1992
[1991?]
[1991 or 1992]

**Published material:**

For published material, the place of publication, name of publisher, and date of publication are to be given in area 4. The date is omitted when cataloging a serial from other than the first issue, as shown in the first example below.

Some Internet items include this information, but many don't. If information is present, treat the item as published. If information is not present, treat the item as unpublished.

**Examples:**

[Washington, D.C.] : DDN Network Info Center,
[Chicago : American Library Association], 1991
[Ann Arbor, MI] : Merit Network, 1991-
Geneva, Switzerland : CERN, 1992

### Area 5. Physical description area [MARC field 300]

Area 5, the physical description area, is omitted for this material according to directions given in AACR 2, because there is no physical item.

### Area 6. Series [MARC fields 4XX, 8XX]

Series information goes in area 6.

**Examples:**

Project Gutenberg etext
Notes from the Bikelab ; no. 12

## Area 7. Notes [MARC fields 5XX]

Notes make up the balance of the bibliographic record. Most notes are optional. One may use as few or as many as desired. If used, however, they must be used in the order of the rules.

Information from two or more notes may be combined into one note as desired.

This list combines notes from *AACR2* chapter 9 (computer files), chapter 12 (serials), and chapter 1 (general).

### 9.7B1a. Nature and scope [MARC field 500]

This note provides brief information on the nature or scope of the file, unless this is apparent from the rest of the description, or is included as part of the summary.

**Examples:**

Electronic newsletter
Fantasy game
Computer music

### 12.7B1. Frequency [MARC field 310]

The frequency of a serial is given here.

**Examples:**

Weekly
Irregular
File continuously updated

### 9.7B1b. System requirements [MARC field 538]

For commercial software packages, this note tells the user, in a formal, structured, manner, what computer is required, how much memory, any additional programs needed, and any special peripherals needed.

For files available by remote access, this note is used to specify any specific program or type of program needed for use with the file and/or any special hardware requirements.

The note begins with the words "System requirements:"

**Examples:**

System requirements: PostScript printer

### 9.7B1c. Mode of access [MARC field 538]

Because a separate local access field (MARC field 856) provides detailed information for access, this note may be brief.

**Example:**

Access through computer network

### 9.7B2. Language/Script [MARC field 500]

The language and/or script of the content of the file is named in this note unless it is apparent from the rest of the description.

**Example:**

Text in Spanish and English

### 9.7B3. Source of the title proper [MARC field 500]

This note is required. For a serial, this information often is combined with the "Description based on:" note.

**Examples:**

Title from first line of file
Title from title display
Title supplied by cataloger
Description based on: Issue 43; title from file header

### 9.7B4. Variations in title [MARC field 500]

The filename could go here if desired and if not given elsewhere.

**Examples:**

Filename: TeXhaxD
Running title: Information resource schema

### 9.7B5. Parallel titles and other title information [MARC field 500]

This note is used for other title information found on the item and not given elsewhere in the bibliographic record.

**Examples:**

"Appendix A"
Request for comments

### 9.7B6. Statements of responsibility [MARC field 500]

This note is used to name any person or corporate body not named in field 245 but important enough to be named in the bibliographic record.

The name of the person who input a file generally is of no bibliographic importance.

**Examples:**

Authors: Chris Weider, Mark Knopper
Material copyrighted by Charles L. Hendrick

### 9.7B7. Edition and history of the file [MARC field 500]

Information about the edition and history of the file is given here if important to users.

**Examples:**

"Adopted July 2, 1991, by the ALA Council"
"This edition ... created from a comparison of various editions determined by age to be in the public domain in the United States"

### 12.7B7. Relationships with other serials [MARC fields 580, 780, and 785]

This note is used to state complex relationships with other computer files.

**Example:**

Continues: NBER time series database

### 9.7B8. File characteristics [MARC field 500]

This note is used for additional information about the file if the information is not available elsewhere in the bibliographic record.

The number of cases or variables making up the files also may be recorded here [MARC field 565].

**Example:**

465 cases

### 12.7B8. Numbering and chronological designation [MARC field 515]

This note is used for anything about the numbering that is not specified in area 3 for serials, or to give complex, irregular, or peculiar designations.

**Examples:**

Numbering irregular
Report year ends June 30

### 9.7B9. Publication, distribution, etc. information [MARC field 500]

This note is used for any important information not already given about publication or distribution of the file.

**Example:**

Issued by ALA Reference and Adult Services Division, Machine-Assisted Reference Section, Direct Patron Access to Computer-Based Reference Systems Committee

### 9.7B10. Physical description, including color or sound [MARC field 500]

Information about color or sound is given in this note if it is not included in a summary.

**Examples:**

Graphics display in color
Plays music as score advances on the screen

### 9.7B11. Accompanying material information [MARC field 556]

If documentation is available as a separate file, that information would go in this note.

**Examples:**

Printed documentation available directly from the originator of the file
Documentation may be printed out from separate file
Documentation at beginning of file

### 9.7B12. Series information [MARC field 500]

**Example:**

Originally issued in series: American national election study series

### 9.7B13. Dissertation note [MARC field 502]

**Example:**

Thesis (M.A.)--Carnegie Mellon University, 1991

### 9.7B14. Intended audience for the item [MARC field 521].

Intended audience is given in a note if the information is stated in the item being cataloged.

**Example:**

Intended audience: Medical personnel and health researchers

### 9.7B15. References to published descriptions [MARC field 510]

This note is not included in chapter 9, but there is a MARC field 510 for the content in coded form. It specifies where the item has been cited.

**Example:**

Indexed by Applied Science and Technology Index

### 9.7B16. Other formats in which the information is available [MARC field 530].

**Examples:**

Available in printed form from ALA
Also available in printed version containing additional information

### 9.7B17. Summary [MARC field 520]

This note provides a brief objective summary of the purpose and content of the item, if needed. It begins with "Summary:" if MARC field 520 is used.

**Examples:**

Summary: Provides abstracts of articles and discussions from the electronic journal Computers and academic freedom news
Summary: Table of ANSI escape code sequences and their functions

MARC field 500 is used if a general note about the purpose of the item is desired that does not begin with the word "Summary."

**Example:**

Discusses the file format structure of the Macintosh and problems on conversions between BinHex files and binary files on a UNIX platform

### 9.7B18. Contents [MARC field 505]

This note provides a formal or informal list of contents of a file. If it is a formal list, it begins with "Contents:"

**Examples:**

Contents: Description of working group -- Goals and milestones

Contents: The Bill of Rights and beyond / Dennis J. Reynolds -- Techno-fallacies of the information age /Gary T. Marx -- Freedom and privacy in electronic libraries / Steve Cisler ...

If an informal note is desired, MARC field 500 is used.

**Example:**

Contains a list of all the documents available via anonymous FTP from the National Science Foundation's Science and Technology Information System (STIS). Also includes instructions for searching the index and downloading the files

A note about bibliographic references in an item would be entered in MARC field 504.

**Example:**

Includes bibliographic references

### 9.7B19. Numbers [MARC field 500]

Numbers appearing on the item that may be important are recorded in this note.

**Examples:**

"RFC 1251"

### 9.7B20. Restrictions, etc. [MARC field 506]

This note states any limitations or restrictions on the use of the item being cataloged.

**Example:**

"Not to be for use or included in any storage or retrieval system in any country other than the United States"

### 9.7B21. "With" note [MARC field 501]

Used to connect bibliographic records for two or more computer files with no collective title that are cataloged individually.

**Example:**

With: AnsiSpecs

### 1.7B22. Combined notes relating to the original [MARC field 534]

Use this note to describe the original item represented by the computer file being cataloged.

**Example:**

Electronic text of: Sophocles. The Oedipus trilogy / by Sophocles ; English translation by F. Storr. Cambridge, Mass. : Harvard University Press, 1912. (Loeb Library)

### 12.7B23. Item described [MARC field 500]

Identifies the issue of the serial on which the description in based.

**Example:**

Description based on: Vol. 91, issue 51 (Nov. 14, 1991)

### Additional MARC Fields

- Additional MARC note fields that do not match any of the *AACR2* rules for notes:
- MARC field 522 is provided for recording geographic coverage of the material.
- MARC field 524 is provided for the preferred citation of the described material.
- MARC field 535 is provided for recording the location of originals or duplicates of the materials.
- MARC field 536 is provided for recording funding information.

- MARC field 565 is provided for recording the number of cases or variables making up the files.
- MARC field 567 is provided for recording methodology used in the item.
- MARC field 581 is provided for recording a citation to or information about a publication based on the use of the file being cataloged.
- MARC field 583 is provided for recording actions.

## Choice and Form of Entry

### Main Entry

Main entry is chosen following rules in AACR 2 chapter 21. There are no special rules for main entry of computer files.

### Added Entries

Added entries are made following AACR 2 rules 21.29-21.30. Added entries should be made for people, corporate bodies, and titles not chosen as main entry, if those entries might be used by patrons when looking for the item.

Any name or title for which an added entry is made must appear somewhere in the bibliographic record.

### Title Added Entries

Title added entries (after format integration) are entered in MARC field 246 for varying form of title or in MARC field 740 for analytical titles.

### MARC field 753

MARC field 753 was developed to provide access to the type of computer used with the computer file being cataloged, as well as for access for additional technical details.

This field is not to be used when cataloging electronic resources, because MARC field 856 will provide all the information needed for these materials.

### MARC field 856

MARC field 856 is proposed to contain all the information necessary for subscribing to, transferring, or otherwise accessing the electronic resource.

### Subject Headings, Classification

Subject headings and classification are not controlled by any national or international standards or requirements. A library may choose what type of subject access it desires. Various committees and authorities have, however, recommended that a library treat computer files just like any other form of material in terms of the number and the kind of subject headings assigned and the type of classification used.

### Examples

These examples do not include added entries, subject headings, or classification numbers.

### Sample 1

| | | | |
|---|---|---|---|
| Type: m | Bib lvl: m | Source: d | Lang: eng |
| File: d | Enc lvl: I | Govt pub: | Ctry: xxu |
| Audience: f | Mod rec: | Frequn: n | Regulr: |
| Desc: a | Dat tp: s | Dates: 1991, | |

100 1 Malkin, Gary Scott.
245 10 Who's who in the Internet $h computer file : $b biographies of IAB, IESG, and IRSG members / $c G. Malkin ; Network Working Group.
256 Electronic document.
260 $c 1991.
538 Access through computer network.
500 Title from title screen.
500 "August 1991."
520 Biographical information about members of the Internet Activities Board (IAB), the Internet Engineering Steering Group (IESG) of the Internet Engineering Task Force (IETF), and the Internet Research Steering Group (IRSG) of the Internet Research Task Force (IRTF).
856 1 $a nic.near.net $d /docs $f whois_whointernet_biographies.txt $s 72190

**Comments:** A scope note was not used here because fuller information is included in the summary.

## Sample 2

| | | | |
|---|---|---|---|
| Type: m | Bib lvl: m | Source: d | Lang: eng@ |
| File: d | Enc lvl: I | Govt pub: | Ctry: ilu@ |
| Audience: g | Mod rec: | Frequn: n | Regulr: |
| Desc: a | Dat tp: s | Dates: 1992, | |

041 1 eng $h grc
100 0 Sophocles.
240 10 Selections. $l English. $f 1992.
245 14 The Oedipus trilogy $h computer file / $c by Sophocles.
256 Electronic document.
260 Lisle, IL : $b Illinois Benedictine College, $c [1992?]
440 0 Project Gutenberg etext
538 Access through computer network.
500 Title from title screen.
505 0 Oedipus the King -- Oedipus at Colonus -- Antigone.
534 $p Electronic text of: $a Sophocles. $t The Oedipus trilogy / by Sophocles ; English translation by F. Storr. $c Cambridge, Mass. : Harvard University Press, 1912. $f (Loeb Library).
856 1 $a mrcnext.cso.uiuc.edu $d /etext/etext92 $f oedip10.txt $s 235567 bytes $k your email address $l anonymous $m Michael S. Hart $n University of Illinois at Chicago
856 1 $a quake.think.com $b 192.31.181.1 $c compressed $d /pub/etext/1992 $f oedip10.txt.2 $q binary $s 99063 bytes

**Comments:** The introductory phrase of field 534 provides the information that otherwise would be in a scope note.

**Sample 3**

| | | | |
|---|---|---|---|
| Type: m | Bib lvl: s | Source: d | Lang: eng |
| File: d | Enc lvl: I | Govt pub: | Ctry: pau |
| Audience: g | Mod rec: | Frequn: u | Regulr: u |
| Desc: a | Pub st: c | Dates: 1989,9999 | |

022 1053-8496
245 00 Quanta $h computer file
246 13 Quanta magazine.
256 Electronic journal.
260 Pittsburgh, Pa. : $b Quanta Magazine, $c 1989-
362 0 Vol. 1, issue 1 (Oct. 1989)-
538 Access through computer network.
500 Title from title page.
500 Editor: Daniel K. Appelquist.
520 Stories of science fiction and fantasy.
856 1 $a unix1.andrew.cmu.edu $b 128.2.35.66 $c compressed $d /pub/quanta $f quanta-*.ps.Z $q binary $z Sample filename: quanta-oct1991.ps.Z
856 1 $a unix1.andrew.cmu.edu $b 128.2.35.66 $c compressed $d /pub/quanta $f quanta-*.ascii.Z $q binary $z Sample filename: quanta-oct1991.ascii.Z
856 1 $a eff.org $b 192.88.144.3 $c compressed $d /pub/journals/quanta $f quanta-*.ps.Z $q binary $z Sample filename: quanta-oct1991.ps.Z $z PostScript file
856 1 $a eff.org $b 192.88.144.3 $c compressed $d /pub/journals/quanta $f quanta-*.ascii.Z $q binary $z Sample filename: quanta-oct1991.ascii.Z

## Appendix C
## Data Dictionary and Regular Expressions

### Dictionary Entries by Category

| Category | Entries | | | |
|---|---|---|---|---|
| Data | calendar | data | font{S} | hershey |
| | map{S} | sound{S} | stat{S} | weather |
| Executable | bin | binaries | localmacros | scripts |
| Game | amoeba | atc | atm | backgammon |
| | battlestar | card{S} | conquer | conquest |
| | hunt | lome | mahjongg | monop |
| | otherrealms | phantasia | poker | quix |
| | rogue | sliding | tkanta | warp |
| | xconq | xtank | yahtzee | |
| | (gnu\|x)?chess{NWS} | game{NWS} | x?trek{VER} | anim{NWS} |
| Image | art | bitmap{S} | gif{S} | graphics |
| | icon{S} | image{S} | pict{S} | shape{S} |
| | tiff | | | |
| News | alt\.{NWS} | bionet\.{NWS} | comp\.{NWS} | faq |
| | netinfo | netnews | news | rec\.{NWS} |
| PC | (v\|e)ga | amiga | apple | cpm |
| | dos{NWS} | from.mac | ibm.pc | mac |
| | macintosh | msdos | next | pc |
| | win3 | window{S} | | |
| Source | ada | alt\.sources\.{NWS} | autoclass. | bsd{NWS} |
| | btree | c\+\+{NWS} | c\-distr | cad{NWS} |
| | calc | calentool | calentool | client{NWS} |
| | cmusnmp | code{NWS} | common.source | comp\.sources\.{NWS} |
| | cplus{NWS} | crc | crypt | ctime |
| | database{S} | editor{NWS} | ka9q | gnu{NWS} |
| | hack | hpdev | hrshytools | inetd |
| | package{S} | packet | plot{NWS} | postgres{NWS} |
| | rayshade | rn\.src | sail | saytime |
| | share{NWS} | software | source{NWS} | src{NWS} |

## Dictionary Entries by Category *(continued)*

| Category | Entries | | | |
|---|---|---|---|---|
| Source | swnet\.sources | tool{S} | util{NWS} | u?emacs{NWS} |
| | filter{S} | c?kermit | lib{NWS} | (x\|y\|z)?modem |
| | (oz\|sb\|em\|unix)?tex | | | |
| System | 386{NWS} | lists\.sun\-managers | khoros | cops{VER} |
| | crack{VER} | slip{NWS} | 4\.3{NWS} | Modula{VER} |
| | [a-z]+2[a-z]+ | ape | arc | benchmark{S} |
| | cnews2 | comm | config | contrib{NWS} |
| | cray | crisp{VER} | csh | dbx |
| | driver{NWS} | dvi{NWS} | ecu3 | elm{VER} |
| | fix{NWS} | functions | g\+\+{VER} | gawk{VER} |
| | gcc{VER} | gdb{VER} | ghostscript{VER} | hp300 |
| | include | ipl | jetroff | kerberos |
| | kern{NWS} | lamport{NWS} | m[0-9] | mail |
| | mit{NWS} | mush{VER} | net{NWS} | news2\.11 |
| | nfs | ntp | oberon | opmvax |
| | parallel | patches | pbmplus{VER} | pcomm |
| | pdcurses | perl{VER} | pex | pgrm |
| | r[0-9]{NWS} | rn{VER} | sendmail | sparcOberon |
| | string{S} | sun{NWS} | sys{NWS} | tape{NWS} |
| | tcpdmp{VER} | tcpip{VER} | teco | tex{VER} |
| | tip | tpic | undump | unix{NWS} |
| | unxarc{VER} | uunet | vax{NWS} | vi |
| | vt1{NWS} | x.contrib | x11{NWS} | xfig{VER} |
| | xmail | xtroff | xview | xview{NWS} |
| | xwinsys | yacc{VER} | x?gopher{VER} | (gnu\|d)?make{VER} |
| | prolog | | smalltalk | snobol |

## Dictionary Entries by Category *(continued)*

| Category | Entries | | | |
|---|---|---|---|---|
| Text | (tech)?report{S} | [0-9]*readme{S} | bib{NWS} | book{PLR} |
| | draft{S} | esperanto | firearms | fortune |
| | guitar | idea{S} | ieee{NWS} | imagine |
| | info{NWS} | lyric{NWS} | man{NWS} | msg{NWS} |
| | neuroprose | note{S} | paper{S} | phone{NWS} |
| | plan{S} | preprint{S} | politic{NWS} | postscript |
| | reference{NWS} | review{NWS} | rfc{NWS} | slang |
| | song{NWS} | spec{NWS} | starchart{NWS} | storie{S} |
| | text{NWS} | unix\-wizards{NWS} | | |

## Regular Expressions and Matching Rules

| Regular Expression | Matches |
|---|---|
| x | The character "x" |
| . | Any character except newline |
| [xyz] | Character class; in this case, the pattern matches either an "x," a "y," or a "z" |
| [abj-oZ] | Character class with a range in it; matches an "a," a "b," any letter from "j" through "o," or a "Z" |
| [^A-Z] | Negated character class; any character except those in the class. In this case, any character an uppercase letter. |
| [^A-Z\\n] | Any character except an uppercase letter or a newline |
| r* | Zero or more *r*'s, where *r* is any regular expression |
| r+ | One or more *r*'s |
| r? | Zero or one *r*'s (that is, an optional *r*) |
| r{2,5} | From two to five *r*'s |
| r{2,} | Two or more *r*'s |
| r{4} | Exactly 4 *r*'s |
| {name} | The expansion of the "name" definition (see above) |
| "[xyz]\\"foo" | The literal string: [xyz]"foo |
| \\X | ANSI-C interpretation of \\x; otherwise, a literal "X" (used to escape operators such as "*") |
| \\123 | The character with octal value 123 |

## Regular Expressions and Matching Rules *(continued)*

| Regular Expression | Matches |
|---|---|
| \\x2a | The character with hexadecimal value 2a |
| (r) | An *r*; parentheses are used to override precedence (see below) |
| rs | Concatenation: the regular expression *r* followed by the regular expression *s* |
| r\|s | Either an *r* or an *s* |
| r/s | Trailing context: an *r* but only if it is followed by an *s*; the *s* is not part of the matched text. |
| ^r | An *r*, but only at the beginning of a line |
| r$ | An *r*, but only at the end of a line; equivalent to "r/\\n". |
| <s>r | An *r*, but only in start condition *s* (see below for discussion of start conditions) |
| <s1,s2,s3>r | An *r*, but only in start conditions *s*1, *s*2, or *s*3 |

## Appendix D

## Guidelines for Participants

Thank you for participating in the OCLC Internet Resources Cataloging Experiment. This document provides essential information and instructions; please read it carefully before beginning the experiment and refer to it as needed.

### Getting Help

If you have questions or problems during the course of the experiment, please contact me by electronic mail, Fax, or phone:

Erik Jul
Communications Manager
Office of Research
OCLC

Internet: ekj@rsch.oclc.org
Fax: (614) 764-2344
Phone (614) 764-4364

We expect that cataloging many of the files in the experimental collection will be rather straightforward; however, we also expect that some files will pose technical and theoretical cataloging problems. For example, some files such as images work in conjunction with other programs; others are in a special output format such as PostScript, troff, or TeX; still others lack even the most fundamental bibliographic information.

Use whatever sources are available to you to solve these problems to the best of your ability, enter whatever data elements are available into the bibliographic record, and record difficulties in the associated log file (see Creating Records). Be sure to create a record, no matter how minimal, for each file assigned to you.

Please remember, this experiment is designed to discover problems associated with cataloging electronic information objects on the Internet; deficiencies in the records created are sure to be the result of difficulties presented by the information objects themselves.

## Introduction

This experiment tests these hypotheses:

1. The current USMARC Computer Files Format and Anglo-American Cataloguing Rules, revised, chapter 9, Computer Files, are adequate for creating descriptive cataloging records for electronic file resources on the Internet.

2. Electronic file resources on the Internet contain sufficient data elements for creation of minimal level cataloging records.

3. Catalog records can provide essential access information for electronic file resources on the Internet by incorporating selected fields from the USMARC Format for Holdings and Locations.

## Methods

- 300 electronic files (text, data, software) have been collected from Internet resources using manual and automated means.
- An information file was created for each information object.
- Each cataloging librarian or cataloging team receives one group of 30 files.
- Participants catalog the items according to the *AACR2R* rules, chapter 9, and the USMARC Computer Files format.
- Participants create MARC-like records using word-processing software, thus creating 900 bibliographic records (30 x 30).
- Participants create a log record for each bibliographic record created.

## Evaluation

The records and log files are analyzed in light of the three hypotheses using manual review and automated statistical analyses.

## Dissemination

OCLC will publish the results of the research in paper and electronic format. The names and affiliations of participants will be acknowledged for their contributions but not associated with any particular record created during the experiment.

## About the Test Collection

The test collection is representative of files found on the Internet. The collection focuses on text files, which account for only 7-8% of files on the Internet but comprise slightly more than half of the files in the test collection. The text files include electronic books, journals, newsletters, poetry, essays, lyrics, guides, lists, papers, reports, and a range of informal, unpublished materials.

The remainder of the test collection consists of various types of software and data files such as source code, programs, games, images, and font files. These files are present in the collection in roughly the same proportions as they exist on the Internet; thus, source files predominate.

## Are These Files Worth Cataloging?

You may feel that some of the files assigned to you for cataloging may be of questionable value. In fact, some files likely are not good candidates for cataloging and would not typically be cataloged. However, this experiment tests whether the file *could* be cataloged and not whether it *should* be cataloged. Use the log file (see Creating Files) to express your estimation of the value of cataloging a particular item.

## Instructions

### Your ID Number

Each participant or team is assigned a number from 01 through 30. You will receive your ID number in a separate mailing. Your ID number corresponds to a set of 30 randomly selected files and associated information files.

## Your Set Number

Your set number and your ID number are identical. Each set contains 30 randomly selected numbers from 001 through 300. Each number corresponds to an electronic file with the name "[number].obj" and an associated information file with the name "[number].info".

### Examples

| | | Corresponding Files | |
|---|---|---|---|
| Your ID/Set Number | Numbers in Set | Object Files | Information Files |
| 017 | 008, 049, 078, 114, 124,... | 008.obj, 049.obj, 078.obj, 114.obj, 124.obj, ... | 008.inf, 049.inf, 078.inf, 114.inf, 124.inf, ... |

## About Your Files

You will use the following files:

1. Set file--tells you which 30 object files to catalog
2. Object files--the electronic files to be cataloged
3. Info files--associated information; one for each object file
4. Bibliographic workform--serves as the basis for a bibliographic record
5. Log file--record your comments, difficulties, and suggestions

## Getting Your Files

### Set File

You will receive your set file by electronic mail.

## Object Files, Info Files, Workform, and Log File

You will obtain your assigned object files, their associated info files, a blank bibliographic workform, and a blank log file from OCLC by using the File Transfer Protocol (FTP).

**To obtain your assigned files,** at your system prompt enter:

ftp zeus.rsch.oclc.org

At the name prompt, enter anonymous.

At the ID prompt enter your Internet address.

**For Object Files**

When connected to the system, change to the directory:

pub/catalog_experiment/docs.

**Example**

cd pub/catalog_experiment/docs

**To get your files,** transfer them from OCLC to your local site using the GET command; enter:

get [number].obj

**Example**

get 078.obj

The system tranfers the file to your current working directory.

**For Info Files**

To get associated information files, change to the pub/catalog_experiment/info directory and use the GET command.

**Example**

get 078.info

**Note:** You do not need to transfer all files during a single session. You may wish to transfer the files only when you are ready to catalog them. This will help you save space on your computer. After cataloging the file to your satisfaction, you can delete the object and information files from your system to save space.

**For the Workform and Log File**

To get a blank workform and log file, change to the pub/catalog_experiment/admin directory and use the GET command. Once you have transferred these files you can copy them locally as needed.

**Examples**

get workform
get log

## About the Info Files

Each object file (*.obj) has an associated info file (*.inf). The info file contains information associated with the file and captured when the file was retrieved from the Internet. Typically, the info file contains information about the object file such as:

| | |
|---|---|
| Filename: | (The name of the file as it exists on the Internet) |
| ID# | Ignore this field. |
| Host | The address of the Internet host computer from which the file was obtained. |
| Bytes | Size of the file in bytes |
| Path | Ignore this field |

The Info file may also contain additional information about the file such as how to subscribe to an electronic journal.

You may incorporate data from the info file into the associated bibliographic record.

**Note:** Certain files are stored in a compressed state and must be uncompressed before viewing. These files typically have an extension such as .zip, .hqx, or .zoo. Other files have been "tarred" using a UNIX compression algorithm. These files have the extension .tar. When these files are "untarred," they typically produce a directory with associated files.

We have tried to limit the number of such files, but some are included in the test set because of the technical, practical, and theoretical cataloging problems they represent. We have tried to note special file conditions in the info files. If you cannot overcome the technical problems presented by these files by uncompressing them or untarring them, please contact the Office of Research at ekj@rsch.oclc.org for assistance.

## Creating Records

During the experiment you are asked to create two files for each assigned electronic file: a bibliographic record and an associated log record.

Blank workforms are provided for your use in creating the bibliographic and log records.

Use a text editing or word processing system to create records and save your bibliographic records and log files as ASCII text files.

## Completing the Cataloging Workform

The workform provides labels for fixed- and variable-fields. This is a suggested list of fields that could appear in a bibliographic record. You may add other allowable fields as necessary, except as limited by the Cataloging Guidelines, below.

## Spacing

For fixed fields, enter a blank space following the colon and then the coded value.

**Example**

File:[space][code]

For variable fields, follow the three-digit tag with four spaces. Enter indicator values in spaces 2 and 3, as appropriate; leave spaces 1 and 4 blank. If both indicators are blank, leave spaces 1 through 4 blank.

Begin entering subfield $a in the fifth space after the tag.

**Examples**

100[space][space][space][space][data]
245[space][ind.1][ind.2][space][data]

### Line Breaks

Do not break lines with a carriage return/line feed character. (If your word processor wraps lines, that's OK. It is not inserting a hard return character.)

### Subfield Delimiters

Use the dollar sign ($) to stand for the subfield delimiter character. Put one space before the subfield delimiter and one space after the subfield code.

**Example**

[space]$z[space]data

Do not enter the subfield delimiter/code for the first subfield $a.

### Repeated Fields

Repeat fields if necessary as allowed.

### Unused Fields

You may leave blank fields in the record.

### File Format

Save the record as an ASCII file.

### Completing the Log File

Complete a log file for each bibliographic record you create. This is where you can record problems, questions, and suggestions concerning the object you are cataloging. We want to learn what practical and theoretical problems you encountered and how they were resolved. In conjunction with the actual bibliographic records you create, the log

file is a vital source of important information. We encourage you to to use the log file freely.

Each log file has three required elements:

1. Your ID number
2. The number of the associated object file
3. The total elapsed time required to catalog the item. (Record your time to the nearest minute; record only the actual time spent cataloging the item and creating the record.

These fields are present in the log file template, which is available via FTP (see Getting Your Files, above).

To record comments about fixed-field elements, enter the fixed-field mnemonic at the left margin, a colon, a space, and your comments.

To record comments about a variable field, enter the three-digit tag number at the left margin, a space, and your comments.

To record general comments, enter the word "general" at the left margin, a colon, a space, and your comments.

**Examples**

File: [your comments...; may be several lines or paragraphs of text.]
100 [Your comment...; may be several lines or paragraphs of text.]
General: [Your comments...; may be several lines or paragraphs of text.]
General: [More comments on another topic or additional thoughts on an earlier topic.]

You may repeat fields as necessary; be sure to begin each comment with the appropriate designator.

## File Naming Conventions

**Important**

Name the records and log files you create according to the following conventions:

Bibliographic records: [object number]-[your ID number].rec

Log records: [object number]-[your ID number].log

The object number is the three-digit number of the object file you cataloged. Your ID number is the number of the set of items you are cataloging. The file extension differentiates between bibliographic records and log files.

**Examples**

198-14.rec 198-14.log
056-29.rec 056-29.log

### Submitting Records and Log Files

You can submit completed records and log files to OCLC by FTP or electronic mail; the FTP method is preferred.

### Using FTP

To submit your competed records and log files using FTP, at your system prompt enter:

ftp zeus.rsch.oclc.org

At the name prompt, enter anonymous.

At the ID prompt enter your Internet address.

Change to the directory pub/catalog_experiment/incoming; enter:

cd pub/catalog_experiment/incoming

Use the send command to transfer the file from your current working directory to the "incoming" directory at OCLC; enter

send [file name]

**Examples**

send 132-24.rec
send 076-01.log

**Note:** Be sure to name your files according to the file naming conventions described above.

### Cataloging Guidelines

In general, catalog your assigned files using the USMARC Computer Files Format and the ASCR2 cataloging rules (revised), chapter 9, Computer Files.

In addition, apply the following guidelines to your cataloging:

Code fixed field elements as appropriate.

Ignore field 049.

Ignore call number fields.

Ignore subject entry fields.

Do not do any authority work for the records you create.

### Specific Fields

#### Field 008, byte 26 (fixed-filed element "File:")

You may find the list of available codes to be inadequate. We solicit your suggested additions or modifications to this list based on your actual experience cataloging a test file. When cataloging, use only the currently validated codes; include your comments in the associated log file.

#### Field 037

This experiment assumes format integration whereby field 265, Source for Acquisition, is subsumed by field 037, Stock Number. Here's what field 037 will look like after format integration.

037 Source of Acquisition

Indicator 1 - Undefined
Indicator 2 - Undefined
$a Stock Number

$b Source of stock number/acquisition
$c Terms of availability
$f Forms of issue

Use field 037 to record the subscription address for electronic journals, newsletters, and such.

### Fields 5xx

Use the 5xx fields for recording instructions on subscribing to electronic journals.

### Field 538

Note mode of access.

### Field 753

Field needs to be broadened to include text, e.g., "requires PostScript printing device."

### Field 852

Use field 852 to record location information. For many files this consists of the host address and the path and file names.

**Example**

852 [NUC] $b [full path name including file name] $z [Transfer in binary mode]

**Note:** Be sure to record problems, comments, and suggested format revisions in the log files.

## Specific Rules

### Area 1

9.1B3 A file name or data set name may be used as the title proper if it is the only name given in the chief source.

### Area 3

9.3B1 and 9.3B2 The list of terms is limited; record your suggested additions in the log files.

### Area 7

9.7B1b and 9.7B1c Rules may need revision to accommodate the Internet environment. Note mode of access.

**Note:** Be sure to record problems, comments, and suggested rule revisions in the log files.

### A Final Word

We hope you find this experiment interesting as well as important. Your participation is vital to its success. Your time and expertise are of great value in terms of the cataloging task alone, but we expect that contribution to be repaid by the service rendered to the profession.

# Appendix E

## The Internet and the NREN: A Bibliography

This bibliography in progress, one of several now available on the Internet and the NREN (National Research and Education Network), will be of interest to librarians, most of whom use computers in their daily work. Other bibliographies on the Internet, "FYI on Where to Start" by Karen Bowers and "Using Networked Information Resources" by Deidre Stanton, may be more useful for those already somewhat familiar with this new terrain. This one was originally intended only for OCLC Office of Research staff use, to support work on OCLC's project, "Assessing Information on the Internet," which has been partially funded by a grant from the U. S. Department of Education.

The list is intended to inform readers of the scope of the discussion of Internet/NREN up to mid-1992. The items on it were found through online searches on WILSONLINE Library Literature, LISA, WORLDCAT, and ERIC. In addition, electronic mail messages provided leads to computer files, as did articles and bibliographies. Many but not all of the items in this list are annotated. Abstracts and extracts that appear here in quotation marks have been copied from the original publications; all other abstracts were written by OCLC staff.

The scope of this list is broad. Articles, books, reports, hearings, and files available via FTP (file transfer protocol) are included. News items have been selectively collected. Technical topics, for example, computer hardware and protocols, are not emphasized. Book reviews, product information and reviews, and articles on computer crime or viruses are excluded, as are audio and videocassettes and recordings. Electronic mail is not emphasized. Users of the list should note that some electronic files may have been dropped from the file servers since the list was compiled.

This bibliography is offered to help librarians become comfortable with the Internet and prepare to make best use of the NREN. Its authors expect that most librarians will eventually be connected to this network and serve as the principal teachers of computer networking for the general public. We also hope that every classroom in the United States will soon participate in the enormous advantages that this new technology can bring.

## The Internet and the NREN: A Bibliography

ACM SIGUCCS Networking Taskforce. FYI on Connecting to the Internet: What Connecting Institutions Should Anticipate. Networking Working Group; August 1992; Request for Comments (RFC) 1359; FYI 16. 25 pp.

Note: Available for anonymous ftp from host nic.ddn.mil, directory rfc; filename rfc1359.txt, file size 53449 bytes. "This FYI RFC outlines the major issues an institution should consider in the decision and implementation of a campus connection to the Internet. In order to provide clarity to the reader, some specific information has been detailed. In doing so, the document has been directed toward U.S. academic institutions that have not yet connected to the Internet. However, the issues for which specific information has been provided can be generalized for any organization that wishes to participate in the world-wide Internet community. It will be necessary for those organizations to obtain the correct and detailed information from their local or national IP service providers. In addition, this document may be used as an evaluation checklist for organizations that are currently connected. Readers are expected to have general familiarity with networking concepts and terminology."

Adler, Prudence S. (ARL [Association of Research Libraries] Assistant Executive Director, Federal Relations and Information Policy). NSFNET Management Issues. ARL; May 1, 1992; 162: 1-3.

Advanced Network and Services, Inc., to Manage NFSNET. *EDUCOM Review*; Winter 1990; 25(4): 44.

ANS (Advanced Network and Service, Inc., Allan H. Weis, President; Joel Maloff, Vice President of Client Services, 100 Clearbrook Road, Elmsford, NY 10523, telephone 914-789-5300, e-mail INFO@NIS.ANS.NET) is a new not-for-profit company formed by Merit, Inc., IBM Corporation, and MCI Communications Corporation that will work under subcontract to Merit, Inc. to help expand and support development of the NREN.

Aiken, Robert [and others] (National Science Foundation). NSF Implementation Plan for Interagency Interim NREN. Washington, DC: National Science Foundation; May, 1992. Draft Copy, Unlimited Distribution.

Note: Available for anonymous ftp from host expres.cise.nsf.gov, directory recomplete; filename impl.ps (PostScript); PostScript file size 249739 bytes. "This document outlines an architecture and implementation plan for the National Science Foundation's Interagency Interim National Research and Education Network (NREN) component of the HPCC Program. The Interagency Interim NREN is intended as a near term research and development program to extend the capabilities and breadth of connectivity of today's research and education (R&E) networks. This network will provide not only the opportunity for agency backbones and mid-level networks to connect to NSF-funded networks, but also act as a limited testbed for new technologies in the migration to a gigabit NREN. In order to ensure a smooth transition to a national gigabit network infrastructure which can support the combined requirements of federal agencies, the U.S. research and educational institutions, and industrial collaborations with U.S. R&E institutions, the National Science Foundation has collaborated with other federal agencies in establishing this framework for the Interagency Interim NREN."

Alberico, Ralph (Computers in Libraries). The Development of an "Information Superhighway." *Computers in Libraries;* January 1990; 10(1): 33-35.

J.C.R. Licklider's 1965 vision of libraries in the year 2000 will be actualized early. NREN, a part of the

federal initiative for High Performance Computing that is planned and supported cooperatively by the federal government, academic institutions, and industry, will create a new global information landscape where long-distance interaction and extremely high-speed transmission will be the norm. Evolving from over 20 years of distributed computing, first in ARPANET and more recently in the current Internet, the NREN is planned to be available to a steadily increasing number of campuses, industrial research labs, and libraries and to achieve a capacity of 3 billion bits per second by 1996.

Alberti, Bob [and others] (University of Minnesota Microcomputer and Workstation Networks Center). The Internet Gopher protocol: A distributed document search and retrieval protocol: University of Minnesota; Spring 1992.

Note: Available for anonymous ftp from host boombox.micro.umn.edu, directory pub/gopher/gopher_protocol; filename protocol.txt; file size 30640 bytes. "The internet Gopher protocol is designed for distributed document search and retrieval. This document describes the protocol, lists some of the implementations currently available, and has an overview of how to implement new client and server applications."

Allen, Robert (At&T). Technology for a New Renaissance. *EDUCOM Review;* Winter 1990: 22-25.

A swift and massive renewal of learning like the one prompted by the invention of the printing press is coming via NREN into a world as confused and as promising as that of Galileo and Copernicus. Scientists at leading academic research institutions, AT&T Bell Labs, and other test beds for NREN technology should work to build cooperative use of this enormous resource among widening circles of public users, including students in high schools. If users work together, they can help transform and strengthen the nation.

American Library Association. Committee-Reported NREN Bills Analysis and Excerpts. *ALA Washington Newsletter;* June 27, 1991; 43(6): 1-9.

American Library Association. National Research and Education Network. *ALA Washington Newsletter;* August 15, 1990; 42(8): 1-2.

Note: "Excerpts from S. Rept. 101-387 of July 23, 1990 on S. 1067, the High-Performance Computing Act of 1990 Senate Committee on Commerce, Science, and Transportation."

Anderson, Greg (MIT Libraries, Cambridge, Massachusetts). Complement or Contradiction: The Role of Acquisitions in the Access versus Ownership Dynamic. *Acquisitions Librarian;* 1991; (6): 3-13.

"There are many issues affecting academic libraries which question our fundamental role and function within the scholarly communities; a continuum of investigating and understanding the economics of scholarship in the 90's; strategic planning--"that vision thing"--for academic librarianship; and, weaving the warp and woof of information technologies into the fabric of our professional lives. Discussions of these factors have centered primarily upon the public service and collections functions. These same factors, however, bring considerable focus upon the role of acquisitions in our organizations. This discussion will define and frame some of the issues, questions, challenges, opportunities, and new directions for acquisitions."

Anderson, Mary Sieminski (Robert Hutchings Goddard Library, Clark University, Worcester, Massachusetts). Networked Information: Issues for Action. *Computers in Libraries;* May 1991; 11(5): 33-35.

Speakers at the 1991 spring conference of the New England Chapter of the Association of College and

Research Libraries addressed the effects of NREN on issues of protections of privacy, security, intellectual property, freedom of speech, and internal and international access; enjoined librarians to guide the evolution of the network to insure truly open public access; and described campus networks, demonstration projects at USDA and ILLINET, expert systems, and librarians' optimal role in shaping information policy.

Anthes, Gary H. (Computerworld staff). Commercial users move onto Internet. *Computerworld;* November 25, 1991; 25(47): 50.

One of several commercial providers of links on the NSF's Internet backbone is Advanced Network & Services, Inc. (ANS), a nonprofit partnership of IBM, MCI Communications, and Merit Network, Inc. ANS has a taxable subsidiary that provides Internet connections unregulated by government restrictions on commercial traffic to customers including Union Carbide, Chevron, Abbott Labs, and Dialog Information Services. Communications for North Carolina Education, Research and Technology (i.e., CONCERT, a North Carolina network that connects 6,500 commercial and research computers) is also an ANS customer; a CONCERT manager says that crashes are not unusual but are diminishing. ANS expects to run at 622M bit/sec speeds by late 1992.

Anthes, Gary H. (Computerworld). Internet makes users KIS-ing cousins. *Computerworld;* May 14, 1990; 24(20): 66.

Knowbot Information Service (KIS), designed by the nonprofit Corporation for National Research Initiatives (NRI), is operational for 400,000 users connecting seven Internet directories. Client Knowbots call server Knowbots through a Transmission Control Protocol/Internet Protocol port; the server Knowbots issue the client's requests to remote directories and format their answers for the client. Marshall Rose (Performance Systems International, Inc., Reston, Virginia) plans interactive service using the CCITT X.500 approved standard for 90% of Internet users by 1997; KIS Knowbots can be trained to work with X.500.

Arms, Caroline R. (University of Pittsburgh). Anonymous FTP: Getting Files on the Internet. *ONLINE;* September 1990; 14(5): 27.

Note: This is a sidebar in "A New Information Infrastructure" by the same author. "Anonymous" is the standard user login name for the File Transfer Procedure (FTP) for downloading public files from the Internet. Instructions for accessing addresses on the Internet and some basic FTP commands, similar to VMS, UNIX, and DOS commands, are given.

Arms, Caroline, Editor. *Campus Networking Strategies.* EDUCOM Strategies Series on Information Technology. Bedford, Massachusetts: Digital Press; 1988; 322.

Note: Part of EDUCOM Strategies Series on Information Technology.

Arms, Caroline, Editor. *Campus Strategies for Libraries and Electronic Information.* Bedford, Massachusetts: Digital Equipment Corporation; 1990; 404.

Note: Part of EDUCOM Strategies Series on Information Technology. Profiles a number of academic and library institutions (including OCLC).

Arms, Caroline R. (Microcomputer and Media Center, Falk Library of the Health Sciences, University of Pittsburgh, Pittsburgh, Pennsylvania). A New Information Infrastructure. *ONLINE;* September 1990; 14(5): 15-22.

Note: Abstract from ERIC. "Provides background on networks and describes two national networks, the Internet and BITNET. Several related topics are also addressed: convergence of BITNET and the Internet; network decentralization; a proposed comprehensive national research and education network (NREN); libraries and the proposed network; and the library of the future. A network resource guide is included."

Arms, Caroline R. (Microcomputer and Media Center, Falk Library of the Health Sciences, University Pittsburgh, Pittsburgh, Pennsylvania). Using the National Networks: BITNET and the Internet. *ONLINE;* September 1990; 14(5): 24-29.

Note: Abstract from ERIC. "Provides guidelines for using two national networks, BITNET and the Internet. The discussion covers electronic mail, bulletin boards, collections of public files, downloading files, logging into remote systems over the Internet, online catalogs and local databases on the Internet, and future applications."

Arvidson, Raymond E. (Washington University, St. Louis, Missouri). The Electronic GSA. Dvorzak, Marie. Geological Societies and Information Transfer in the Electronic Age: Proceedings of the Twenty-fifth Meeting of the Geoscience Information Society; October 29-November 1, 1990; Dallas, Texas. Alexandria, Va.: Geoscience Information Society; 1991; 21: 37-39.

The Geological Society of America is urged to improve and expand service to its members at lower cost by implementing e-mail, becoming a node on the Internet, and investigating possibilities for publication of digital manuscripts and digital transfer via CD-ROMs of cartographic data sets that are too large (650 MByte) to be published by traditional means.

Association of Research Libraries. Linking researchers and resources: The emerging information infrastructure and the NREN proposal. Washington, D.C.: Association of Research Libraries; 1990.

Avery, David (Dartmouth College, Hanover. New Hampshire). LISTSERV LISTS. Hanover, New Hampshire: Dartmouth College.

Note: Available for anonymous ftp from host dartcms1.dartmouth.edu, directory SIGLISTS; filenames READ.ME (for information about the file), LISTSERV.LISTS, file size 383249 bytes.

Avram, Henriette D. (Library of Congress). Copyright in the Electronic Environment. *EDUCOM Review;* Fall 1989; 24(3): 31-33.

The Library of Congress Networkworking Advisory Committee (NAC), established in 1976 to advise the Librarian of Congress and promote networking, has made protection of intellectual property rights in the electronic environment its highest priority. In March 1988, five NAC subgroups considered several views of the status of copyright in the electronic environment, then independently concluded that the current copyright system works; NAC also agreed the law will be difficult to administer and that clarification is particularly needed regarding database compilations, derivative works, ownership of databases and the information on them, and compensation for intermediaries.

Bailey, Charles W., Jr. (University Libraries, University of Houston, Houston, Texas). Electronic (Online) Publishing in Action...*The Public-Access Computer Systems Review* and Other Electronic Serials. *ONLINE;* January 1991; 15(1): 28-35.

Serials in electronic form suggest a need to redefine the term "serial." Bailey reports issues, solutions to emerging problems, and recommendations based on the experience of pioneering efforts by the University of Houston Libraries, where he and his colleagues started an electronic conference, Public-Access

Computer Systems Forum (PACS-L), on BITNET in June 1989; a journal, *The Public-Access Computer Systems Review*, in January 1990; and a newsletter, *Public-Access Computer Systems News*, in March 1990.

Bailey, Charles W., Jr. (University Libraries, University of Houston). Electronic Serials on BITNET. *Computers in Libraries;* April 1991; 11(4): 50.

Note: "This article is reprinted from the *Computers in Libraries '91 Proceedings*." A summary (by the moderator of PACS-L) of electronic publishing on BITNET and an outline of The University of Houston's electronic serials that go free to 1,900 PACS-L users in twenty-eight countries.

Bailey, Charles, W., Jr. (University of Houston Libraries, Houston, Texas). Library-Oriented Computer Conferences and Electronic Serials on Bitnet and Internet. *Database Searcher;* February/March 1991; 7(2): 22-23.

Describes how BITNET and Internet conferencing and serials work, gives details about addresses and how to join and participate or subscribe.

Bailey, Charles W., Jr. (University of Houston Libraries, Houston, Texas). Library-Oriented Computer Conferences and Electronic Serials; 1992.

Note: Message from discussion list Public-Access Computer Systems Forum (PACS-L). Available to subscribers of PACS-L, or send e-mail message to LIB3@UHUPVM1.BITNET.

Bailey, Charles W., Jr. Network-Based Computer Conferences and Electronic Serials for Librarians. *Research & Education Networking;* September 1991; 2(7): 8-9.

Bailey, Charles W., Jr. (University Libraries, University of Houston). Network-Based Electronic Serials. *Information Technology and Libraries;* March 1992; 11(1): 29-35.

Note: This paper was delivered at the Sixth Annual Conference of the North American Serials Interest Group, June 15, 1991. "New forms of scholarly communication are evolving on international computer networks such as BITNET and Internet. Scholars are exchanging information on a daily basis via computer conferences, personal e-mail, and file transfers. Electronic serials are being distributed on networks, often at no charge to the subscriber. Electronic newsletters provide timely information about current topics of interest. Electronic journals, which are often refereed, provide scholarly articles, columns, and reviews. Utilizing computer networks, scholars have become electronic publishers, creating an alternative publication system. Electronic serials hold great promise, but a variety of problems currently limit their effectiveness. Given the serials pricing crisis, librarians should encourage the development of network-based electronic serials."

Bailey, Charles W., Jr. (University Libraries, University of Houston, Texas). The Public-Access Computer Systems Forum: A Computer Conference on BITNET. *Library Software Review;* March/April 1990; 9(2): 71-74.

Bailey, Charles W., Jr.; Rooks, Dana. Symposium on the Role of Network-Based Electronic Resources in Scholarly Communication and Research. *The Public-Access Computer Systems Review 2;* 1991; (2): 4-60.

Note: May be obtained by sending e-mail message GET BAILEY1 PRV2N2 as a file to: LISTSERV@WHUPVM1.BITNET; file size 121493 bytes.

Barron, Billy (University of North Texas). UNT's Accessing On-Line Bibliographic Databases: University of

North Texas; February 11, 1992. 170.

Note: Available by anonymous ftp from host vaxb.acs.unt.edu, directory library; filename LIBRARIES.TXT (ASCII) or LIBRARIES.WP5 (binary for WordPerfect 5.1 file), file size 285155 bytes.

Basch, Reva (Aubergine Information Services, Berkeley, California). Books Online: Visions, Plans, and Perspectives for Electronic Text. *ONLINE;* July 1991; 15(4): 13-23.

An overview of the swift and diverse evolution of electronic books as envisioned by 20-year-old Project Gutenberg (Director Michael Hart). Most work is in the humanities and moving forward at the Georgetown Center for Text and Technology (LISTSERV@BROWNVM via BITNET, Command "get projects e-texts humanist"); Darmouth Dante Project(dante@eleazar.dartmouth.edu); e-text mapping project at National Center for Machine Readable Texts in the Humanities (a joint effort of Rutgers and Princeton); several grassroots "E-text" publishers; and Online Book Initiative (OBI) in Brookline MA (phone 617-739-0202), which specializes in public domain materials. The Text Encoding Initiative (TEI), supported by three scholarly groups (Association for Computers and the Humanities, Association for Computational Linguistics, Association for Literary and Linguistic Computing), aims at a transmission standard based on Standard Generalized Markup Language (SGML). This detailed overview considers copyright issues and other legal problems and describes a "state of the future" system, Public Access Xanadu (PAX), a hypermedia server to be test-marketed in 1993 by the Xanadu Operating Company, a subsidiary of Autodesk.

Bausenbach, Ardith (Library of Congress). The Library Joins Internet. *LC Information Bulletin;* December 17, 1990; 49(25): 440.

Kenneth M. King, president of EDUCOM, described NREN for LC Online Users Group in July 1990; LC joined Internet October 1990. NREN is expected to operate at 1 billion bits per second by late 1990s, carrying multimedia including graphics and sound.

Beiser, Karl (State Library of Maine). Library Technology Through a Wide-angle Lens. *Wilson Library Bulletin;* May 1991; 65(9): 48-50.

Bell, C. Gordon (Ardent Computer Corp., Sunnyvale, California). Gordon Bell calls for a U.S. research network. *IEEE Spectrum;* February 1988; 25(2): 54-57.

Former NSF official known for work on VAX superminicomputer described then-current chaos in information sharing among government and university networks; presented chart showing burgeoning number of research networks and linked "internets"; projected capabilities of a national research network and the projected July 1989 linking, via Merit, Inc. on NSFNET backbone, of 6 supercomputers and 7 regional university networks. Bell felt US had already lost world leadership in computer networking; strongly recommended that US Government leave aside fierce interagency rivalries and support growth of NREN from NSFNET and Arpanet. He presented a 3-step plan of development for a network that by the early 2000s would have a capacity 100,000 times that available in 1988.

Bell, Gordon (Ardent Computer, Inc., Sunnyvale, California). Steps Toward a National Research Telecommunications Network. *Library Hi Tech;* 1988; 6(1): 33-36.

"In response to provisions in Public Law 99-383, which was passed 21 June 1986 by the 99th Congress, an inter-agency group under the auspices of the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET) for computer Research and Application was formed to study the following issues: the networking needs of the nation's academic and federal research computer programs, including

supercomputer programs, over the next 15 years, addressing requirements in terms of volume of data, reliability of transmission, software compatibility, graphics capabilities, and transmission security; the benefits and opportunities that an improved computer network would offer for electronic mail, file transfer, and remote access and communications; and the networking options available for linking academic and research computers, including supercomputers, with a particular emphasis on fiber optics. Bell reports on the process and recommendations associated with the committee's work, and suggests a means for accomplishing the network objectives addressed by its report."

Bendig, Mark (OCLC Online Computer Library Center, Inc., Dublin, Ohio). Background Information about Internet. *OCLC Micro;* April 1990; 6(2): 36.

The packet-switching technology underlying Internet is outlined. The protocols that permit smooth transfer of diverse types of data, Transfer Control Protocol (TCP) and Internet Protocol (IP), are clarified in a simplified process analysis, revealing a highly efficient and intricate system.

Bennion, Bruce C. (University of Southern California). Information Accessibility and Beyond (reply to F. W. Lancaster and Jindong Li). *Bulletin of the American Society for Information Science;* April/May 1989; 15(4): 24-25.

Berners-Lee, Tim [and others] (CERN, Geneva, Switzerland). World-Wide Web: The Information Universe. Geneva, Switzerland: CERN; 1992.

Note: Available for anonymous ftp from host nxoc01.cern.ch, directory pub/www/doc; filename Article_9202.ps (PostScript). Also available for anonymous ftp from host csuvax1.csu.murdoch.edu.au, directory pub/library/soft; filename wwwinfo.doc.ps (PostScript). Filesize 119719 bytes. "The World-Wide Web (W3) initiative is a practical project to bring a global information universe into existence using available technology. This article describes the aims, data model, and protocols needed to implement the 'web', and compares them with various contemporary systems."

Berry, John N., III (Library Journal Editor-in-Chief). NREN and the Information Implosion. *Library Journal;* February 1, 1992; 117(2): 6.

Note: Editorial captioned, "A giant electronic network that may only serve a few?" The author sees NREN moving toward an information implosion, ie, service of the information needs of that small fraction of the populace who are engaged in scholarly, professional or commerce-based research, rather than service of accessible, free libraries where citizens can stay informed about the forces that affect their everyday lives. The view of information as a commodity suggests that choices will favor making money via NREN over providing access for a broad public and an information explosion.

Birchfield, Marilee (Northwestern University Library). Casting a New Net: Searching Library Catalogs via the Internet. ERIC Document Reproduction Service (Computer Microfilm International Corporation): Alexandria, VA; November 8, 1990. 6.

Note: "This paper is based largely on a previously published paper, of the same title by Marilee Birchfield, Norman Weston, and Betsy Baker in *Northwestern University Computing and Networking* 5(3): 36-39, Fall 1990."

"Noting that telecommunications technology is making it possible to search library catalogs around the nation and the world via a modem and a personal computer, this paper highlights some of the reasons why a researcher would wish to search library catalogs through the Internet, which is a network of networks with connections to nearly 1,000 regional, government, and campus networks. The paper also discusses

some of the problems that may be encountered by researchers who wish to use Internet to retrieve information, and describes efforts being made in the Northwestern University library's reference department to improve the existing documentation on Internet for its users. Outreach programs designed to increase faculty members' awareness and use of remote catalogs are also described. The paper concludes with a discussion of efforts being made on a national scale to extend the outreach of the Internet, which will promote the provision of information resources on existing networks and on proposed interconnected networks."

Bishop, Ann P. The National Research and Education Network (NREN): Promise of New Information Environments. Alexandria, VA: ERIC Document Reproduction Service (Computer Microfilm International Corporation); November 1990; EDO-IR-90-4. 4.

Note: Published in ERIC Digest. Abstract from ERIC. "This digest describes proposed legislation for the implementation of the National Research and Education Network (NREN). Issues and implications for teachers, students, researchers, and librarians are suggested and the emergence of the electronic network as a general communication and research tool is described. Developments in electronic communications and computing since the late 1960s are reviewed, including the development of such networks as ARPANET, NSFNET, Internet, BITNET, CSNET, and CREN. Implementation of the National High Performance Computing Act of 1990 would provide for: (1) the involvement of science agencies and national libraries in the development of resources for the NREN; (2) the linking of federal and industrial laboratories, educational institutions, and libraries; (3) the development of electronic information resources and services; and (4) the development of supercomputers and advanced software to support scientific and engineering research. However, before such a network can be instituted, several issues need to be resolved, including how to determine costs and management policies, guarantee universal access, provide user support and training, overcome organizational resistance to networking, maintain quality control of information resources, and adapt network services to research and education norms. New initiatives for network research, services, and advocacy have emerged as a result of growing support for national networking; these include the Corporation for National Research Initiatives, Reference Point, the Coalition for Networked Information, and the Electronic Frontier Foundation. One common goal of these initiatives, one that educators and librarians share, is the desire to shape the future of national networking in such a way that its benefits are made available to a broad range of users."

Bishop, Ann P. The National Research and Education Network (NREN): Update 1991. *ERIC Digest;* December 1991.

"Federal legislation authorizing the creation of the National Research and Education Network (NREN)--i.e., the High Performance Computing Act of 1991 (P.L. 102-194)--was signed into law by the President in December 1991. This network is envisioned as an expansion and enhancement of the existing U.S. Internet, the collection of interconnected computer networks that is currently used by over one million U.S. researchers, educators, students from K-12 to postgraduate levels, and others. This digest reports on the current status of Federal policy initiatives related to the NREN and discusses trends and issues in electronic networking that are of interest to members of the education and library communities. The digest lists important features of the Federal Government's plans for funding, creating, and managing the NREN. It is noted that the government hopes the development of the NREN will enhance national productivity and competitiveness as well as speed scientific and technical advances in a number of fields. It is argued that the potential of the NREN to dramatically change the nature of education and scholarship is becoming more apparent, particularly when the library and education communities are continuing to expand their use of electronic networks. The digest concludes by indicating types of issues involved in the transition to a networked information environment, and some technology trends that could have an impact on networking."

Bishop, David (University of Illinois). The White House Conference and the National Research and Education Network: A timely partnership. *C&RL News*; April 1991; 52(4): 233-234.

BITNET Headed for New Frontiers. *Science;* February 2, 1990; 247(4942): 520.

Bloch, Erich (National Science Foundation). A National Network: Today's Reality, Tomorrow's Vision, Part 1. *EDUCOM Bulletin;* Summer/Fall 1988; 23(2/3): 11-13.

The Director of the National Science Foundation envisions the universal sharing of intellectual resources on the national network; outlines major issues--technology, access, funding, and governance; and urges collaboration among private and public entities.

Boissonnas, Christian M. (Cornell University Library). Electronic Networks and the Acquisitions Profession. *Library Acquisitions: Practice & Theory;* 1991; 15: 423-425.

The Acquisitions Librarians Electronic Network (ACQNET) began in late 1990 and quickly attracted a diverse membership, less than half of them acquisitions librarians. Despite the enormous benefits of e-conferencing, the author, who is the conference moderator, notes three potential problem areas: 1) since some people only ask questions or listen, the answerers and discussants may tire of giving input to the asker/listener group without having the gratification of a response; 2) the speed of the system can prompt an unwarranted and stress-producing sense of urgency among participants; 3) ACQNET librarians may be losing touch with librarians who aren't on BITNET or Internet, a risk that the author suggests OCLC may be able to alleviate by helping librarians communicate among themselves electronically.

Boucher, Rick (U.S. House of Representatives). The Challenge of Transition. *EDUCOM Review;* September/October 1992; 27(5): 30-35.

The NREN is the most promising feature of the High-Performance Computing Act; it will advance the nation in many ways. To finish its development, however, requires new approaches. Allowing telephone companies to provide cable service would give them incentive to make the extensive investment necessary for installing fiber optic cable over the "last mile" of the network into private homes; this process is the most costly element of NREN development, and restrictions on phone companies should be lifted. Blacksburg, Virginia is a model of an electronic community, with fiber optic cable throughout. For a successful NREN, planning and management must remain a collaboration among government, industry, and universities. Open communication in management planning is essential. The goal should remain opening the use and benefits of the network to the broad population and pushing the limits to ensure wide use and reliable services. Response to this statement is encouraged, and should be directed to the U.S. House of Representatives Subcommittee on Science.

Boucher, Rick (United States Congressional Representative, Ninth District, Virginia). The Vision of the National High-Performance Computing Technology Act of 1991. *Information Technology and Libraries;* March 1992; 11(1): 56-58.

Communication among all interested parties is crucial to the success of the NREN. To ensure that it happens, the US House of Representatives included a provision in the 1991 High-Performance Computing Technology Act to require interaction among federal, nonfederal, education, research, and industry communities.

Bowers, K. (Karen) [and others] (Corporation for National Research Initiatives (CNRI), Reston, Virginia). FYI on Where to Start - A Bibliography of Internetworking Information: User Services Working Group of the Internet Engineering Task Force; August 1990; Latest Update May 30, 1991; Request for Comments 1175;

FYI 3. 43 pp.

Note: Available for anonymous ftp from host nic.ddn.mil, directory rfc; filename rfc1175.txt; file size 94417 bytes. Begun in 1989 and updated periodically, this bibliography of information about internetworking is designed for beginners, but its updates should be valuable for more advanced members of the Internet community as well. Distribution is unlimited. It is organized into sections for articles; bibliographies; books; conferences and workshops; glossaries; multimedia; newsletters; reports and papers; and the requests for comments (RFCs) that are a stock in trade for communication within the Internet community. Authors are invited to submit entries for updates. This overview of information resources helps readers understand how to enter the networking environment while respecting its complexities.

Branscomb, Anne W. (Harvard University Program on Information Resources Policy). Common Law for the Electronic Frontier. *Scientific American;* September 1991; 265(3): 154-158.

Legal practices are evolving and will continue to evolve from use and precedent in the information environment just as laws evolved from community practice in the past, but cyberspace is now much like the so-called "wild west." Although many legal concepts are thoroughly recast and practice now outstrips some traditional protections of privacy and intellectual property, litigation and open legislative debates can lead to consensus and a new body of common law.

Breivik, Patricia Senn; Shaw, Ward (University of Colorado; Colorado Alliance of Research Libraries). Libraries Prepare for an Information Age. *Educational Record;* Winter 1989; 70(1): 13-19.

Campus libraries need flexibility and vision to cope with funding limitations and increasing numbers of journals. New technologies are changing library practice and needs in four principal areas: 1) access to materials is more important than ownership, and sharing among institutions streamlined; 2) various information sources--CD ROMS, hardbound books, video, and online service--need to be integrated systematically and shared; 3) libraries will go to users on electronic networks; 4) the concept of literacy should be expanded to include the ability to acquire, use, manage, and update information. Librarians should be prepared to coach students as they develop these skills.

Brett, George H., II. Navigating the Internet: A beginning. *North Carolina Libraries;* Fall 1992: 143-146.

Encouragement and specific recommendations for Internet users and potential users who may be overwhelmed by the abundance of resources available. Brett advises starting with paper-based resources, learning to navigate and organize the information on one's own system well, using email, and finally using interactive services on the Internet.

Britten, William A. (University of Tennessee, Knoxville, Tennessee). BITNET and the Internet: Scholarly networks for librarians. *College & Research Libraries News;* February 1990; 51(2): 103-107.

Britten, William A. Retrieving HyperCard Stacks Over the Internet. *Research & Education Networking;* October 1991; 2(8): 8-10.

Brownrigg, Edwin (The Memex Research Institute). Developing the Information Superhighway: Issues for Libraries. Chicago, Illinois: American Library Association; 1990.

Commissioned by the Library and Information Technology Association, a division of the American Library Association (ALA), this paper was presented for the first discussion of the National Research and Education Network (NREN) among a large audience of librarians--the 1990 ALA Annual Conference in Chicago. Ten principles are presented: 1) NREN content must be protected by the First Amendment; 2)

publishing on the NREN should undergo no licensing or other scrutiny; 3) enforcement of policies should not include prior review, but come after the fact; 4) NREN should be a free market, not a monopoly, and if it fails, common carrier regulations should apply; 5) NREN should include a right of universal interconnection; 6) users would be required to disclose their amount of use of NREN; 7) government and common carriers should not regulate what is carried on NREN; 8) the appearance of bottlenecks should not be used as justification for adding controls; 9) regulation of the electromagnetic spectrum for education and research should be separate from regulation for current interstate commerce; 10) intellectual property should be recognized. These principles are held as consistent with the pluralistic evolution of libraries in the United States. The impact of NREN on library service is explored.

Brownrigg, Edwin B. (Memex Research Institute, Roseville, California). The Internet as an External Economy: The Emergence of the Invisible Hand. *Library Administration & Management Association;* Spring 1991; 5(2): 95-97.

Follows up history and discussion of the paper titled "Developing the Information Superhighway" by the same author, who outlines the politico-economic issues and questions about who will manage NREN, who will fund it, and whether it will serve the public good directly or indirectly.

Brownrigg, Edwin; Butler, Brett (Memex Research Institute, California State University, Chico, California). An Electronic Library Communications Format: A Definition and Development Proposal for MARC III. *Library Hi Tech;* 1990, 31(3): 21.

"The Memex Research Institute has proposed a research project to describe in machine-readable form all the information needed to create electronic `books' in a standard communications format. Two kinds of extended computer file formats employing the MARC structure will be defined: Access Formats that take into consideration the many existing index and abstract system formats and their associated databases; and Document Formats that provide for storage, representation, transmission, and display of machine-readable works in text or image form. The formats that emerge can be employed by libraries, publishers, information utilities, and computer users worldwide to convert printed works to electronic forms or to create original works in electronic format, and thus foment the creation of networked electronic library collections."

Brugger, Judith M. (Cornell University, Ithaca, New York). Where Libraries and the Internet Meet. *ALCTS Newsletter;* 1991; 2(1): 2-3.

Note: In column titled "NISO Annual Meeting." Report on speech given by Dr. Vinton G. Cerf, Vice President, The Corporation for National Research Initiatives (CNRI).

Brunell, David H. Internetworking Services and the Electronic Library. *Journal of Library Administration;* 1991; 15(3-4): 21-36.

Note: Abstract from ERIC. "Discusses management issues that librarians face in offering public access to library resources through internetworking services, e.g., local area networks, campus networks, or the INTERNET. It is concluded that interface problems and lack of an effective technical support structure make access to library information on INTERNET more of an experiment than an ongoing service at this time."

Butler, Brett (Memex Research Institute, California State University, Chico, California). The Electronic Library Program: Developing Networked Electronic Library Collections. *Library Hi Tech;* 1991; 9(2): 21-30.

Note: Cumulative issue #34. "The Memex Research Institute (MemRI), an independent non-profit research

and development organization, has created an Electronic Library Program of shared research and development in order to make the vision of Vannevar Bush's `memex' more concrete. The program is working toward the creation of large, publicly available indexed electronic image collections of published documents in academic, special and public libraries. The initial objective of the Memex Research Institute has been the development of a strategic plan that defines a combination of publicly searchable access databases, image (and text) document collections stored on network `file servers,' local and remote network access, and an intellectual property management control system. This combination of technology and information content is defined in this plan as an E-Library or E-Library Collection."

Buxton, Andrew (University College, London (UK)). JANET and the Librarian. *The Electronic Library;* August 1988; 6(4): 250-263.

"JANET (the Joint Academic Network) is a wide-area network linking together computers and users in British universities, polytechnics, establishments of the research councils, and the British Library. It provides for interactive working, file transfer, electronic mail and job transfer. Online access is possible to many catalogues of university and polytechnic libraries, the British Library's BLAISE-LINE and ARTel services, and various bibliographic and numeric databases held on university computers. Users registered for electronic mail can use JANET to send this kind of mail to other sites in Britain, or overseas through the EARN, BITNET, and NORTHNET combined network. There are two-way gateways between JANET and British Telecom network PDN, allowing access to commercial online hosts in Great Britain or overseas. These gateways can provide a faster and cheaper alternative to dial-up use of PDN."

California Education and Research Federation Network. CERFnet user's guide. San Diego, California: California Education and Research Federation Network; 1990.

"The California Education and Research Federation Network (CERFnet) is a mid-level network that provides access to the Internet. Our goal is to promote collaboration among scientists, engineers, and educators in commercial, government, and academic sectors. CERFnet links you to a wealth of information and resources, such as databases, online library catalogs, public domain software, special-interest electronic mailing groups, supercomputers, online documentation, and over a million users worldwide. The CERFnet User's Guide represents a starting point for you."

Carl-Mitchell, Smoot (Texas Internet Consulting). Internetting a Sun. *SunExpert Magazine;* August 1990; 1(10): 57-74.

How to find the appropriate regional network and connect a local network to it to access the Internet with a Sun. Specifies how to obtain a network number and domain registration; two methods for solving the problem (current in 4.0.3. release of SunOS) of fitting the Domain Name Server (DNS) into the Network Information Server (NIS); nameserver database maintenance; subdomains; mail exchange; routers; Interior Gateway Routing Protocol (IGRP). Ten rules for Internet etiquette (eg, don't run bandwidth intensive packages) and security (eg, use gateways, routers and frequently-changed root passwords) are offered.

Carlitz, Robert D. (University of Pittsburgh). Common Knowledge: Networks for Kindergarten through College. *EDUCOM Review;* Summer 1991; 26(2): 25-28.

If students in every classroom K-12 in the United States had access to NREN, as is within the scope of current technical and economic capabilities, our education system would undergo a massive upgrade, current disparities among educational opportunities would be swiftly leveled, and children and teachers will be able to structure, control, and explore vast areas of knowledge.

Casorso, Tracy M. (North Carolina State University Libraries, Raleigh, North Carolina). The North Carolina State

University Libraries and the National Agricultural Library Joint Project on Transmission of Digitized Text: Improving Access to Agricultural Information. *Reference Services Review;* Spring 1991: 15-22.

Catlett, Charles E. The NFSNET: Beginnings of a National Research Internet. *Academic Computing;* January 1989; 3(5): 19-21, 59-64.

Note: Abstract from ERIC. "Describes the development, current status, and possible future of NFSNET, which is a backbone network designed to connect five national supercomputer centers established by the National Science Foundation. The discussion covers the implications of this network for research and national networking needs."

Catlett, Charles E. (University of Illinois at Urbana-Champaign). The NSFNET: Beginnings of a National Research Internet. *Academic Computing;* January 1989; 3(5): 18-21.

Cerf, V. (Vinton) (Corporation for National Research Initiatives (CNRI)). The Internet Activities Board: Network Working Group; May 1990; Request for Comments 1160. 11.

Note: Available for anonymous ftp from host nic.ddn.mil, directory rfc; filename rfc1160.txt; file size 27564 bytes. "This RFC provides a history and description of the Internet Activities Board (IAB) and its subsidiary organizations. This memo is for informational use and does not constitute a standard. This is a revision of RFC 1120. Distribution of this memo is unlimited."

Cerf, Vinton G. (Corporation for National Research Initiatives (CNRI)). Another Reading of the NREN Legislation. *Telecommunications;* November 1991; 25(11): 29-30.

This article appeared with and responded to Jay Habegger's "Why is the NREN Legislation So Complicated?" The author, a leading authority who helped develop ARPANET, emphasizes the collaborative structure of the Internet, the technological necessity of participation by private companies, and the complex mix of 5000 university, commercial and government networks now on the Internet. Private investment in fiber optic transmission enabled the NREN as much as legislation. The author recognizes that others may read the NREN legislation more narrowly but affirms its hospitality to development of new private sector interests and to participation by the broadest segment of society. Despite the uncertainties and imperfections of NREN development, the Internet's success to date in bringing together millions of users suggests that a free and open public/private collaborative system can continue to grow and thrive.

Cerf, Vinton G. (Corporation for National Research Initiatives). The Internet Society. *EDUCOM Review;* Fall/Winter 1991; 26(3/4): 11-12.

The Internet Society, a nonprofit, has been chartered "A. To facilitate and support the technical evolution of the Internet as a research and education infrastructure and to stimulate involvement of the academic, scientific, and engineering communities, among others, in the evolution of the Internet. B. To educate the academic and scientific communities and the public concerning the technology, use, and application of the Internet. C. To promote scientific and educational applications of Internet technology for the benefit of educational institutions at all grade levels, industry, and the public at large. D. To provide a forum for exploration of new Internet applications and to foster collaboration among organizations in their operation and use of the Internet." To join, individuals and organizations should contact the Society at 1895 Preston White Drive, Suite 100, Reston, VA 22091; 703-620-8990; fax 703-620-0913; e-mail: ISOC@NRI.RESTON.VA.US.

Cerf, Vinton G. (Corporation for National Research Initiatives (CNRI)). Networks. *Scientific American;*

phase out when commercial networks are sufficiently developed, but the development process prompts many debates.

Clement, John (EDUCOM). Constructing the K-12 Collaboratory on the NREN. *EDUCOM Review;* May/June 1992; 27(3): 18-20.

Note: In column titled "K-12 Networking."

"If we are to make the NREN a truly empowering tool for educational reform on a national (or, better yet, global) scale, we must create network-using collaborations for K-12 educators. We could conduct a national study of groundwater quality by having classes study and develop a sampling model, calibrate instruments, and collect information, in their own districts, that would be fed into regional, state, or national databases."

Clement, John (EDUCOM). The EDUCOM K-12 Networking Project: Accelerating the Learning Process. *Research & Education Networking;* June/July/August 1991; 2(5 & 6): 12-14.

Clement, John (EDUCOM). Network-based Collaborations: How Universities Can Support K-12 Reform Efforts. *EDUCOM Review;* January/February 1992; 27(1): 9-10, 12.

Note: In column titled "K-12 Networking."

Collaborations between university scholars and teams of high school and elementary teachers, on projects where students help gather real data and produce useful conclusions under the guidance of specialists in the research area, are advised as a powerful way to drive K-12 reform. Universities should participate in bringing Internet connections to schools by passing on hardware and by encouraging their students and faculty to become involved in such projects.

Clement, John (EDUCOM). Statewide Network Connections for K-12 Educators. *EDUCOM Review;* March/April 1992; 27(2): 17-20.

Clement, John (EDUCOM). Where We Are in Networking for K-12 Education: A First Annual Review. *EDUCOM Review;* September/October 1992; 27(5): 20-23.

Note: In column titled "K-12 Networking."

"During the year, the Texas Education Network (TENET) went from zero to 12,000 accounts, exceeding even its own wildest expectations....It is my guess that the number of connected K-12 educators with access to the NREN will surpass 50,000 by mid-1993....We need to grow in our representation, and I invite you to write me for information if you are interested....The Buddy System project in Indiana and a project in New York City make computers widely available in the school and send computers to the homes of low-income students judged to be at risk."

Cline, Nancy (Pennsylvania State University Libraries). Information Resources. *EDUCOM Review;* Summer 1990; 25(2): 30-34.

The NREN brings a new interdependence of librarians and telecommunications resources, a concern with access as opposed to ownership, and new expectations for scholarly interaction. The evolution of a "virtual library" has started with online serials databases; bibliographic databases (OCLC and Research Libraries Information Network, RLIN); exchange of catalog information by Internet; ILL by fax (Consortium on Institutional Cooperation's CICnet); subject-based databases like ERIC, AGRICOLA, MEDLINE and

hundreds of others; PenPages database at Pennsylvania State University College of Agriculture; Penn State's LIAS database that typically handles 33,000 searches per day; electronic bulletin boards like the Economic Bulletin Board System (EBBS) of US Dept of Commerce; and datafiles from the University Consortium for Political and Social Research. Nonbibliographic files now being developed will be available from Research Library Group's PRIMA (Program for Research Information Management)--eg, the Medieval and Early Modern data bank. Examples of special databases include the Index of Christian Art, the Inventory of American Sculpture, the National Archaeological Sites Database, and a neurocircuitry database. A Geo Referenced Information Network will share descriptions of maps, aerial photographs, atlases, core samples, and other geodata useful in mining, food production, and public policy. Librarians and educators should collaborate and actively lead users to develop skills necessary for efficient navigation in these vast resources.

CNI Steering Committee (Coalition for Networked Information). Information Technology Imaging: A Vision of a New Advanced Networking Utility. *EDUCOM Review;* Winter 1990; 25(4): 14-15.

Note: "The following is the CNI Vision statement #2, developed by the Steering Committee of the Coalition for Networked Information. For information on CNI, contact Paul Evans Peters at 202 232-2466."

Expanding capabilities for very high speed inexpensive sharing of information through electronic means rather than paper is changing the nature of scholarly interchange. Information Technology Imaging (ITI) aims to bridge this movement from paper-based information exchange to electronic, and CNI will assist its members with ITI-related projects.

Coalition for the National Research and Education Network. *NREN: The National Research Education Network.* Washington, D.C.: Coalition for the National Research and Education Network; 1989. 15.

Note: Catalog describing background and activities of the Coalition for the National Research and Education Network.

Colorado State University. Glossary of Networking Terms. Boulder, Colorado: Colorado State University.

Note: Available via anonymous ftp from host yuma.ACNS.COLOSTATE.edu, directory: general.info; filename: glossary.network; file size 9897 bytes.

Condon, Christopher. BITNET USERHELP; October 1990.

Note: Available via e-mail from host NETSERV@BITNIC.BITNET; message GET BITNET USERHELP; file size 44930 bytes.

Connolly, Frank W. [and others] (EDUCOM). A Bill of Rights for Electronic Citizens, Part One. *EDUCOM Review;* Summer 1991; 26(2): 37-41.

Excerpted from a study made for the Office of Technology Assessment of the US Congress, this historical analysis of the defining characteristics of print media compared with electronic media suggests the need for revision of the concept of intellectual property.

Connolly, Frank W. (EDUCOM). A Bill of Rights for Electronic Citizens, Part Two. *EDUCOM Review;* Fall/Winter 1991; 26(3/4): 53-56.

Freedom in the flow of electronic information must be protected; while collaborative academic work is

September 1991; 265(3): 72-81.

"As the diversity of computer applications increases, the burgeoning flow of megabit traffic between machines will be accommodated by wider and smoother highways." Worldwide digital communication will be facilitated by Knowbots and packet switching (as distinguished from circuit switching). Fiber-optic packet technologies, including Fiber Distributed Data Interface (FDDI); Distributed Queue Dial Bus (DQDB); Frame Relay, Integrated Services Digital Network (ISDN); gigabit-speed capabilities of computers linked in parallel; Synchronous Optical Network (SONET); Asynchronous Transfer Mode (ATM); and Broadband ISDN can be organized into a hierarchy. The layers of this hierarchy, from bottom up, are envisioned as 1) physical, ie, the means of transmission of signals, whether electronic, radio frequency, or optical; 2) link, where these signals are made into chunks; 3) network, where packet switching permit computer-to-computer communication; 4) transport, or the internets where flow and congestion are controlled, and where current public (DARPA, NSF, NASA, US Dept of Energy) and private (Xerox, IBM, Digital Equipment Corporation) research and development are focused; 5) session, where programs interact; and 6) presentation, where information is exchanged. Network management is concerned with all these levels.

Cerf, Vinton G. (Corporation for National Initiatives). Thoughts on the National Research and Education Network: Network Working Group; July 1990. 8 pp.

Note: Network Working Group Request for Comments 1167. Available for anonymous ftp from host nic.ddn.mil, directory rfc; filename rfc1167.txt, file size 20232 bytes. This unlimited-distribution memo written for users of the Internet assumes that NREN will grow from the Internet and presents a highly enlightened personal view of the fundamental technological considerations and policy questions that need to be answered as NREN emerges in the US and links globally. Constituents including users, service providers and vendors; operations; and commercial interests are included in the overview.

Cerf, Vinton G. (Corporation for National Research Initiatives). Where Libraries and the Internet Meet. *Information Standards Quarterly;* October 1990; 2(4): 3-6.

Note: Report of speech at National Information Standards Organization (NISO) Annual Meeting, 9/10/90 New York Public Library.

The Corporation for National Research Initiatives (NRI), a nonprofit founded in 1986 with initial funding from DEC, Xerox, and IBM, exists to perform R&D on the Internet, an international collaborative effort in 35 countries. Pragmatism and experimentation are the norm on the Internet; no standards are set until drafts have been circulated among the community, approved by the Internet Activities Board, and implemented. Digital technology permits self-replicating "Knowbots" to search documents across systems for answers to users' questions. The digital library includes 1) documents that are simply scanned traditional texts, 2) entire databases 3) images and sound as well as text. Intellectual property rights may be protected as electronic documents may be programmed to control and record who is using them.

Chapin, A. Lyman (Bolt Beranek and Newman). The Internet Architecture Board and the Future of the Internet. *EDUCOM Review;* September/October 1992; 27(5): 42-45.

"As the Internet continues to grow at an astonishing rate, the organizations concerned with its health and well-being, including the IAB [Internet Architecture Board] and its task forces, must react and adapt quickly and imaginatively. The largely unwritten policies and procedures that worked well when the Internet community consisted of a handful of like-minded network researchers cannot adequately serve a community of thousands of people with different interests and concerns. The recent publication of RFC [Request for Comments] 1310, which describes the procedures for the development and approval of

Internet Standards, represented a first step: it will soon be followed by the formation of an IETF [Internet Engineering Task Force] study group charged with evaluating how and in what ways the growth of the Internet and its constituency may require changes to (or formalization of) the policies and procedures of the IAB and its task forces."

Churbuck, David. Civilizing Internet. *Forbes;* July 8, 1991; 148(1): 90-91.

Ciolek, T. Matthew (Australian National University, Canberra, Australia). INTERNET VOYAGER (a.k.a. ELECTRONIC VOYAGER GUIDEBOOK) SOCIAL SCIENTIST'S GUIDEBOOK TO AARNET/INTERNET. Online Information Services. Canberra, Australia; 1992.

Note: Available for anonymous ftp from host coombs.anu.edu.au, directory coombspapers/coombswork/coombs-computing; filename internet-voyager.txt, file size 85402 bytes.

Cisler, Steve (Apple Computer Library, Cupertino, California). The Library Community and the National Research and Education Network. *Wilson Library Bulletin;* June 1990: 51-55.

Note: Includes sidebar announcing formation of the Coalition for Networked Information by ARL, CAUSE, and EDUCOM.

Eighty years ago a brief union of AT&T and Western Union promised a national highway of electrical communication, and a Knowledge Network passed Congress in the late 1960s but was unfunded. The Gore bill (S. 1067) expands Internet and specifies involvement by and for libraries. The new system is expected to increase library use, and it may help equalize school resources. Librarians must become involved in the emerging NREN.

Cisler, Steve (Apple Library). The National Research & Education Network. Online/CD-ROM '90 Conference Proceedings; November 5-7, 1990. Weston, CT: Online, Inc.: 31-35.

"Pending legislation in Congress, supported by a wide spectrum of governmental, educational, and commercial interests will fund the development of a wide bandwidth (3 gigabits per second) network that will build on the Internet and change the way many people use their computers. This paper outlines the history of the NREN effort, why there is so much excitement about it and some of the current controversy over the network."

Cisler, Steve (Apple Library, Cupertino, California). NREN Update: More Meetings and New Tools. *DATABASE;* April 1991; 14(2): 96-98.

Reports on meetings, including the second meeting of CNI: "knowledge management" at Welch Medical Library at John Hopkins University; Online Mendelian Inheritance in Man project; pricing at the National Library of Medicine; and a plan for publishing the information policies of organizations and associations. A symposium on Strategic Computing and Telecommunications in the Public Sector at Harvard looked at NREN policy and feasibility questions; most agreed building the network will prompt new uses for it. An Office of Technology Assessment hearing Dec. 11, 1990 prompted disagreements about access. NCSA Telnet and MacTCP (Apple programs) are described.

Cisler, Steve (Apple Computer Library, Cupertino, California). NREN: The National Research and Education Network. *LITA Newsletter;* Spring 1990; 11(2): 1-2.

Presents a summary of the Gore bill (S. 1067); cites the many networks described in Quarterman's *The Matrix* as evidence of need for an information infrastructure. The federal funding for NREN is planned to

increasing, we need to find new systems for assigning credit for work. Rules for enforcement of intellectual property rights that work for print media will need to be revamped for the electronic age.

Cook, Gordon (Cook Network Consultants, Ewing, New Jersey). A national network that isn't. *Computerworld;* March 9, 1992; 26(10): 91-94.

Corbin, Lisa (Freelance writer, New York, NY). Governing the Gutenberg Galaxy. *Government Executive;* January 1992; 24(1): 30-32, 34.

This general view of the development of the Internet and plans for the NREN connects its coming impact on society with Marshall McLuhan's 30-year-old predictions for an "all-at-once" environment. Corbin also describes Senator Albert Gore's 12-year effort to achieve the 1991 enabling legislation, and presents a number of the improvements in information-sharing that the NREN will bring, including composite imaging, distributed computing, interactive visualization of scientific experiments, and other collaborations.

Corbin, Roberta A. (University of California, San Diego Libraries). The Development of the National Research and Education Network. *Information Technology & Libraries;* September 1991; 10(3): 212-220.

"The development of a new technology occurs in several phases. First is the replacement of traditional manual functions with automated ones. Next, people see the potential of using the technology, and new uses and ways of doing things are devised. Finally, society itself changes as a result of that technology. These societal changes are occurring with the development of networks on a local, regional, national, and international scale. The purpose of this paper is to trace the development of national networks, describe their current condition, and discuss the future implications of and obstacles to the accomplishment of the vision."

Coursey, David. Riding the Internet. *Infoworld;* February 4, 1991; 13(5): 48, 57.

This description quotes some of Internet's several users directly. The author says that (unnamed) "detractors" call Internet "anarchy net"; that it is "Unix-based"; that it began in 1979 in North Carolina as a bulletin board "between two universities"; that Usenet was the precursor; and that a spirit of cooperation predominates.

Coy, Peter. How Do You Build an Information Highway? *Business Week;* September 16, 1991; (3231): 108-109, 112.

Dalton, Marian L. (IBM, Portland, Maine). Does Anybody Have a Map? Accessing Information in the Internet's Virtual Library. *Electronic Networking;* Fall 1991; 1(1): 31-39.

DeCandido, Graceanne A.; Rogers, Michael. "Virtual Library" Promulgated by Library/Education Coalition. *Library Journal;* April 15, 1990; 115(7): 14.

Sharing library resources electronically is a major goal of NREN, started by the Coalition for Networked Information (CNI). CNI was formed by the Association of Research Libraries, CAUSE, and EDUCOM, with sponsorship from Apple Computer, Digital Equipment Corporation, IBM, and Xerox. A CNI task force will study questions, eg, intellectual property rights, standards, licensing, cost recovery fees, and economic models, relevant to the new information infrastructure.

Delfino, Erik. Electronically Speaking. *LITA Newsletter;* Summer 1991; 12(3): 13-14; ISSN: 0196-1799.

Note: Issue 45.

A reading list prepared for the 8th Annual Federal Library and Information Center Committee Forum on Federal Information Policies is offered, to help library decision-makers understand NREN.

Dern, Daniel P. (Freelance writer, Watertown, Massachusetts). Applying the Internet. *BYTE;* February 1992; 17(2): 111-118.

Dern, Daniel P. The ARPANET is Twenty: What We Have Learned and The Fun We Had. *ConneXions;* October 1989; 3(10): 2-9.

A brief survey of how an experiment in connecting computers conducted by the US Advanced Research Projects Agency in 1969 led to NREN--here called NERN.

Dern, Daniel P. The ARPANET is Twenty: Interview with Vint Cerf. *ConneXions;* October 1989; 3(10): 11-14.

An informal history of the Internet via conversation with one of its principal founders indicates that no one expected such rapid and voluminous development.

Dern, Daniel P. The ARPANET is Twenty: Quotes from some of the players. *ConneXions;* October 1989; 3(10): 15-22.

Pioneer ARPANET/Internet developers Robert Kahn, Heidi Heiden, Leonard Kleinrock, Larry Roberts, Frank Heart, Einar Stefferud, and Eugene H. Spafford share historic, specific memories and assessments directly with interviewer Daniel P. Dern.

Dertouzos, Michael L. Building the Information Marketplace. *Technology Review;* January 1991; 94(1): 29-40.

The next step beyond NREN is to create a "National Information Infrastructure" that permits complete interconnection of computers locally, nationally and globally. Such an information infrastructure will create a renaissance of trade and learning; without interconnectivity we are as impeded in terms of information use and flow as we would be in transportation if we drove cars only on our own lots.

Dertouzos, Michael L. (Laboratory for Computer Science, Massachusetts Institute of Technology). Communications, Computers and Networks. *Scientific American*; September 1991; 265(3): 62-69.

Dertouzos' is the lead article of eleven in a Special Issue of *Scientific American* that is subtitled, "How to Work, Play and Thrive in Cyberspace." The other authors are Lawrence Tesler, Vinton Cerf, Mark Weiser, Nicholas Negroponte, Alan Kay, Thomas Malone, John Rockart, Senator Al Gore, Anne Branscomb, Lee Sproull, Sara Kiesler, and Mitchell Kapor.

Deutsch, Peter. Resource Discovery in an Internet Environment--The Archie Approach. *Electronic Networking: Research, Applications and Policy;* Spring 1992; 2(1): 45-51.

Note: Abstract from ERIC.

"Describes Archie, an electronic indexing service for locating information on the INTERNET. The resource discovery problem addressed by the service is summarized, and instructions for accessing Archie are provided. The current scope of the Archie service and plans for the future are discussed. Other information discovery and delivery tools available in the INTERNET environment are also considered."

Doctor, Ronald D. Social Equity and Information Technologies: Moving toward Information Democracy. *Annual Review of Information Science and Technology (ARIST).* Williams, Martha E. ed. Medford, New Jersey: Learned Information, Inc.; 1992; 27: 43-96.

Note: Published on behalf of the American Society for Information Science (ASIS).

Wide access to information is crucial in a democracy, but information poverty is widespread in the United States. A literature review focuses on five related topics (1) the relation between society and technology; (2) concepts of power and control in democracy; (3) concepts of social justice and equity; (4) information needs, sources, and uses; and (5) mass information delivery systems. Since current improvements in U.S. information dissemination systems seem to be geared primarily for upper-middle income citizens and one-third of the U.S. population is considered information-poor, a national debate on ways to achieve information equity is called for.

Doty, Philip; Bishop, Ann Peterson; McClure, Charles R. (School of Information Studies, Syracuse University, Syracuse, New York). The National Research and Education Network (NREN): An Empirical Study of Social and Behavioral Issues. In Henderson, Diane, ed.; *ASIS '90: Proceedings of the 53rd ASIS annual meeting, Toronto, Ontario, November 4-8, 1990;* Toronto, Ontario. Medford, New Jersey: Learned Information, Inc.; 1990; 27: 284-299.

"This paper describes certain aspects of a study of the use of electronic networks by scientists and engineers. The study of network use was conducted in order to make policy recommendations for the proposed national research and education network (NREN) and combines traditional social science empirical methods with policy analysis. The paper describes the study's methodology and identifies major social and behavioral issues related to network use. It argues that qualitative techniques, such as semi-structured interviews and focus groups, provide data important to the development of user-based policies and that social and behavioral issues must be given more attention by network policy makers."

Dougherty, Richard M. (American Library Association, Chicago, Illinois). An ideal win-win situation: the national electronic highway. *American Libraries;* February 1991; 22(2): 182.

The NREN presents unbounded opportunities for growth of libraries if librarians help promote and take charge of the elctronic information revolution.

Dougherty, Richard M. (American Library Association, Chicago, Illinois). Pathways to Our Future. *School Library Journal;* February 1991; 37(2): 43.

Note: In column titled "Make Your Point."

[The previous article, with special encouragement for school librarians.].

Drew, Wilfred. Not Just Cows: A Guide to Internet/Bitnet Resources in Agriculture and Related Sciences. Morrisville, NY: Morrisville College of Agriculture and Technology; May 8, 1992.

Note: Available for anonymous ftp from host ftp.unt.edu, filename AGRICULTURE-INTERNET.TXT, file size 86556 bytes.

Drummond, Louis (Library of Congress, Washington, D.C.). Going Beyond Online. *ONLINE;* September 1990; 14(5): 6-8.

Note: In column titled "The Inverted File."

Internet growth brings three challenges to information professionals: 1) user directory maintenance methods and potential costs to end-users for access to remote databases through the Internet; 2) methods for finding, joining, sorting, and storing data from computer conferences; 3) workable ways to locate, evaluate and use articles from electronic journals.

Duderstadt, James J. (University of Michigan). An Information Highway to the Future. *EDUCOM Review;* September/October 1992; 27(5): 36-41.

EDUCOM's Networking and Telecommunications Task Force (EDUCOM, Princeton, New Jersey). *A National Higher Education Network: Issues and Opportunities*. Princeton, New Jersey: EDUCOM; May 1987. 19 pp.

Note: NTTF Paper Number One.

"One of the key roles that colleges and universities play in our national economy is to foster the flow of intellectual and human capital from campus to industry and government. Increasingly important to this flow are the various communication networks that now link campuses, government, and industry. While these computer networks are undeniably a national resource, they have not been viewed as part of the total system for higher education. Most have been limited by agency or constituent outlooks, and have grown without full understanding of the costs and missed opportunities inherent in uncoordinated development. Technical advances, new regulatory environments, and a critical mass of interconnected research laboratories, libraries, and higher education institutions are changing our information framework. If we continue to develop national networking in an ad hoc fashion, a substantial opportunity may be lost. Concerted action by the leadership in higher education is required now. EDUCOM and its members believe that there is an urgent need for a coordinated national high-speed computer network linking colleges, universities, federal research laboratories, library resources and industrial partners; this network should allow communications among a broad set of academic and research users, regardless of specific disciplines, missions, or funding sources; and it is in the national interest to develop the plans for the network and to coordinate individual efforts among federal and state agencies that would affect the development."

Elliott, Susan (Alaska State Library). Introduction to Bitnet and the Internet. *The Sourdough*; Spring 1992; 29(2): 9-10.

Engel, Genevieve (MELVYL System User Services, University of California). User Instruction for Access to Catalogs and Databases on the Internet. *Cataloging & Classification Quarterly;* 1991; 13(3/4): 141-156.

"Online library catalogs and other information resources accessible through network connections offer students and scholars a variety of useful data, but present special problems to remote users. Issues facing the user of Internet-accessible systems include knowing how to reach a system; finding out what a system contains; mastering commands and menu structures; using appropriate kinds of search terms; and choosing among systems to meet information needs effectively. These issues should be addressed by bibliographic instruction librarians and others who develop instructional units for access to systems on the Internet."

Engle, Mary E. (Division of Library Automation, University of California). Electronic Paths to Resource Sharing: Widening Opportunities Through the Internet. *Reference Services Review;* Winter 1991; 19(4): 7-12, 62.

The history, advantages, problems, solutions, and prognosis for online public access catalogs on the Internet are considered, based on the University of California experience with MELVYL. The MELVYL system permits access via the Internet to CARL (Colorado Alliance of Research Libraries), OCLC, RLIN, Brookhaven National Laboratory Electronic Library, the Cleveland Free-Net, and several other systems.

Access can be impaired, however, by lack of a standard interface and command system; also, older items in a collection may not yet be entered in its online catalog.

Engle, Mary (Division of Library Automation, University of California, Oakland, California). Library Systems on the Internet. *DLA Bulletin*; Fall 1989; 9(2): 1-4; ISSN: 0272-037X.

Cooperation among libraries is growing via Internet.

Ensor, Pat. Standards Become Part of Legislation. *Information Standards Quarterly;* April 1992; 4(2): 1-3.

Ensor, Pat (Electronic Information Services, Indiana State University Libraries). Through Clean Living and Hard Work, I Get a Column, OR What BITNET Can Do For You. *Technicalities;* January 1992; 12(1): 4-6.

Note: In column titled "Database Commentary."

Executive Office of the President, Office of Science and Technology Policy. *The Federal High Performance Computing Program.* Washington, D.C.: Executive Office of the President, Office of Science and Technology Policy; September 8, 1989.

Farley, Laine [and others]. Library Resources on the Internet: Strategies for Selection and Use. Chicago, Illinois: American Library Association, Reference and Adult Services Division, Machine-Assisted Reference Section, Direct Patron Access to Computer-Based Reference Systems Committee; August 1991.

Note: Available for anonymous ftp from host dla.ucop.edu, directory pub/internet; filename libcat-guide; file size 109226 bytes.

Farrow, Rik (UNIX WORLD staff writer). Will Success Spoil the Internet? *UNIX WORLD;* September 1991; 8(9): 79-86.

Federal Coordinating Council for Science, Engineering, and Technology, Committee on Physical, Mathematical, and Engineering Sciences. *Grand Challenges 1993: High Performance Computing and Communications.* Washington, DC: National Science Foundation, Computer and Information Science and Engineering Directorate; 1992.

Note: The second in a series of reports. The preceding report (Grand Challenges: High Performance Computing and Communications, the FY 1992 U.S. Research and Development Program), published in 1991, was reproduced in McClure et al, *The National Research and Education Network: Research and Policy Perspectives* (q.v.).

Federal investment proposed for FY 1993 is $803 million, a 23% increase over FY 1992. With the goals of extending U.S. leadership in high performance computing, disseminating technology to serve the nation and the global environment, and improving industrial competitiveness, the High Performance Computing and Communications Program supports research and encourages development in many fields. Cooperation among nine federal agencies, industry, and academic researchers will continue to be fostered via four related component programs: (1) High Performance Computing Systems; (2) Advanced Software Technology and Algorithms; (3) National Research and Education Network; (4) Basic Research and Human Resources. Integration and development in these areas is expected to continue producing unprecedented advances in communications infrastructure development, pharmacology, medicine, education, high speed civil transportation, chemistry, and geophysics.

Fiedler, David (InfoPro Systems). Anonymous on the Net. *BYTE;* October 1991; 16(10): 285-286.

Instructions and suggestions for finding and downloading files via Internet using anonymous FTP; also describes a commercial provider of Internet connection for individuals.

Fisher, Sharon (Freelance writer, San Francisco, California). Networking: Promises and Problems. *BYTE;* OUTLOOK '92 -Special Edition: 117-121.

Fisher, Sharon (San Francisco-based freelance writer). Whither NREN? *BYTE;* July 1991; 16(7): 181-189.

A succinct description of NREN and the public/private ownership policy debate surrounding it, including a statement by Senator Albert Gore of Tennessee, its champion.

Flanders, Bruce (Kansas State Library, Topeka, Kansas). NREN: The big issues aren't technical. *American Libraries;* June 1991; 22(6): 572-574.

Interaction is the NREN's major advantage; librarians are urged to become involved in its development.

Flower, Eric (University of Hawaii - West Oahu). Meckler on the Internet. *Computers in Libraries;* November 1991; 11(10): 4-5.

Note: In column titled "From the Editor."

Announces availability of MeckJournal and other electronic services from Meckler on Bitnet and the Internet.

Frey, Donnalyn; Adams, Rick. *!%@:: A Directory of Electronic Mail Addressing and Networks.* Sebastopol, CA: O'Reilly & Associates, Inc.; 1991.

Note: Part of the Nutshell Handbook series, editor Tim O'Reilly.

Approximately 130 research and education networks worldwide are indexed by name, type, and country. Appendices list second- and third-level domains, ISO country codes; includes an introduction to email for beginners and a reply card for notification of updates.

Getz, Malcolm (Vanderbilt University, Nashville, Tennessee). National Research and Education Network. *The Bottom Line;* 1989; 3(4): 32-35.

Gilder, George (Hudson Institute). Into the Telecosm. *Harvard Business Review;* March-April, 1991; 69(2): 150-161.

Vast economic and cultural improvements can evolve from the explosion of growth in microchip and fiberoptic technology, if regressive regulations do not continue to stifle development of fiberoptic service to homes in the United States. Microchip storage capacity is growing at several times the rate of capacity to lead from the chip to connect to others: this difference is eroding top-down communication hierarchies in the business world and helping enrich collaborative entrepreneurs who serve individuals. Nicholas Negroponte suggested that digitized video move through fiberoptic cables and digitized voice messages move through air, permitting replacement of POTS (plain old telephone service) with PANS (pictures and new services), and replacement of broadcast TV aiming glandular culture at a mass audience with narrowcast TV aiming programs from many thousands of sources to millions of individuals who use their brains and telecomputers to choose what they want. The United States risks losing its superiority in communications technology to Japan, where delivery of fiber to homes is a goal and where the Ministry of

International Trade and Industry foresees a fiber network generating one-third of the national GNP by 2020.

Goode, Joanne; Johnson, Maggie (University of Kentucky). Putting Out the Flames: The Etiquette and Law of E-Mail. *ONLINE;* November 1991; 15(6): 61-65.

Electronic mail is swift but also permanent; to prevent blunders, the authors derive suggestions from their own experience, electronic forums, interviews of colleagues, and 12 previous studies in the print literature. To encourage e-mail and keep culture predominant over technology, they discourage innuendo, retaliations and emotional outbursts ("flaming") but suggest that, if necessary, they be labelled as such. Keep messages short and on a single topic that is defined clearly in the header; distribute very conservatively; denote whom replies should be sent to; know your audience; separate facts from opinions; proofread for spelling and tone before mailing; never send anything illegal or anything you would hesitate to sign publicly; avoid using the reply key when answering widely-distributed messages because it will broadcast your answer; remember that e-mail confidentiality and privacy do not exist, particularly in corporations; don't forward private mail without permission of the author; keep non-forum topics out of forums; help newcomers. The Electronic Communications Privacy Act of 1986 protects only against intrusion into a stored system and interception of communications while they are being transmitted (except under court order).

Gore, Al (United States Senate). Gore Bill Applies High-Tech to Schools, Health Care, Business Key Part of Senate's Economic Leadership Strategy Unveiled Today. Washington, DC: Office of U.S. Senator Al Gore; July 1, 1992.

Note: Available for anonymous ftp from host nis.nsf.net; path /internet/legislative.actions/itta.1992/; filename gorebill.1992.txt; file size 34873 bytes.

Gore, Al (United States Senate). Infrastructure for the Global Village. *Scientific American;* September 1991; 265(3): 150-153.

The U.S. Congress needs to provide seed money to build the fiber-optic network and leadership to transform convoluted, conflicting regulations and policies that impede delivery of fiber-optic lines to homes into a forward-looking telecommunications policy.

Gore, Albert [and others] (United States Senate). High-Performance Computing Act of 1991. Washington, D.C.: United States Senate; March 14, 1991.

Note: Text of Senate Bill 272 introduced by Senator Gore and others.

This "bill to provide for a coordinated Federal research program to ensure continued United States leadership in high-performance computing" mandates a Federal Coordinating Council for Science, Engineering, and Technology and charges this Council to develop a 5-year National High-Performance Computing Plan, including efforts and resources of NSF, NASA, and the departments of Defense, Energy, Health and Human Services, Interior, Education, Agriculture, Library of Congress and others. Expanded research in computer science is to be aimed at "Grand Challenges," ie, "fundamental problem[s] in science and engineering, with broad economic and scientific impact, whose solution will require the application of high-performance computing resources." Section 4 amends the National Science and Technology Policy, Organization, and Priorities Act of 1976 (42 U.S.C. 6601 et seq.), specifying components of this plan. Section 5 establishes the National Research and Education Network, to be capable of "multi-gigabit-per-second" transmission, for 1996, linking public and private research throughout the country. NSF is the lead agency for NREN.

Gore, Albert, Jr. (United States Senate). The Information Infrastructure and Technology Act. *EDUCOM Review;* September/October 1992; 27(5): 27-29.

Note: "The following article is adapted from the floor statement of Senator Albert Gore, Jr., on Introduction of the Information Infrastructure and Technology Act of 1992, July 1, 1992."

An overview of the four main elements of the five-year Information Infrastructure Development Program: (1) the National Science Foundation will support connection of libraries ($150 million) and primary and secondary schools ($300 million) to NSFNET, including software and teacher training; (2) National Institute of Standards and Technology will support networking for the manufacturing sector ($250 million); (3) National Institutes of Health (NIH) will support links among hospitals, doctors' offices, and universities ($300 million); and (4) NIH and NASA will develop digital libraries, i.e., text, image, video, and sound databases ($150 million). For fiscal years 1993-1997, the total authorization is $1.15 billion.

Gore, Albert (United States Senate). Remarks on the NREN. *EDUCOM Review;* Summer 1990; 25(2): 12-16.

"A nationwide network will create a second information revolution in America."

Gould, Stephen B. (Library of Congress, Washington, D.C.). An Intellectual Utility for Science and Technology: The National Research and Education Network. *Government Information Quarterly;* 1990; 7(4): 415-425; ISSN: 0740-624X.

"This article will provide a brief overview of the primary computer network structures serving the U.S. academic research community. Plans for transforming the Internet into a National Research and Education Network are moving forward under the leadership of the National Science Foundation and the Federal Research Internet Coordinating Committee. The article outlines the scope of computational and information resources likely to be available to users through the national network, and highlights the role envisioned for the network in facilitating effective remote interaction by researchers with colleagues, scientific instruments, and data. When fully implemented, the national network can serve both as a powerful utility that extends the capabilities of scholars, scientists, and engineers, and as a testbed for an electronic information infrastructure available to every home, office and factory in the United States in the 21st century."

Graham, Ellen. Plug In, Sign On And Read Milton, An Electronic Classic. *Wall Street Journal.* New York, New York; October 29, 1991; A: 1.

"Project Gutenberg is sending good books to computers everywhere--for free."

Graham, Peter S. (Rutgers University Libraries, New Brunswick, New Jersey). Electronic Information and Research Library Technical Services. *College & Research Libraries;* May 1990; 51(3): 241-250.

"The relation of libraries to the electronic information explosion has been a focus of discussion for several years, but the impact of this explosion on the technical services function within libraries has not been adequately explored. In what follows, my contention is that technical services are not solely dependent on decisions their libraries make regarding electronic information. They should be a driving agent as well."

Granrose, Jon. List of Internet sites accepting anonymous ftp; December 23, 1991.

Note: Available for anonymous ftp from host pilot.njin.net, directory pub/ftp-list; filename ftp.list; file size 148789 bytes. Also available via e-mail to odin@pilot.njin.net with a *subject* of "listserv-request" and in the body of the message, put SEND FPT.LIST.

Grundner, Dr. Tom (National Public Telecomputing Network). Whose Internet Is It Anyway?--A Challenge. *ONLINE;* July 1992; 16(4): 6-7, 10.

Note: Contained in column entitled "the inverted file."

"When the NREN comes online, the money to build it will be coming from that apparently forgotten group of people called 'taxpayers.'...We should be working toward a common framework with enough 'conceptual bandwidth' to include everyone....What is at issue is whether the information age is something that happens to us, or something that happens for us."

Grycz, Czeslaw Jan (Division of Library Automation, University of California, Oakland, California). Economic Models for Disseminating Scholarly Information. *DLA Bulletin;* Summer 1991; 11(1): 1, 3-4, 24.

Gurbaxani, Vijay (Graduate School of Management, University of California, Irvine). Diffusion in Computing Networks: The Case of BITNET. *Communications of the ACM;* December 1990; 33(12): 65-75.

"Using BITNET as a model, the author examines the adoption pattern of computing networks from the perspectives of innovation diffusion theory and economics."

Habegger, Jay (University of Colorado at Boulder). Why is the NREN Proposal So Complicated? *Telecommunications;* November 1991; 25(11): 21-26.

For the author, a student finalist in an ICA paper competition, clarification and role definition appear to be lacking for NREN: few details are available about what NREN will be, who will be served by it, what role the private sector will have, and how it will affect public policy. A report on how NREN will be commercialized is not due until 1 year after it starts. The US telecommunications industry has been regulated following specifications in the Communications Act of 1934 by the FCC, but its bureaucracy has not been involved in the NREN. The public sector agencies that have been involved--NSF, DARPA, and DOE--do not have clear role definitions from Congress. Private firms appear to be waiting for the government to take the NREN market development risks, then leave profit for the private sector; but currently NSF virtually controls which private firms will thrive because it is by far the major buyer of services. In Congressional hearings, Dr. Allan Bromley, science advisor to the President, envisioned NREN as a private sector utility that will evolve into a National Network much like the privately owned telephone system, but Tracey Gray of US Sprint saw Congress' creation of NREN as likely to lead to a government-owned and operated system.

Hall, Stephen C. (Harvard University Office for Information Technology). The Four Stages of National Research and Education Network Growth. *EDUCOM Review;* Spring 1991; 26(1): 18-25.

Note: Reprinted in *Information Technology Quarterly*, Summer 1991. [See next entry.]

Hall, Stephen C. (Harvard University Office for Information Technology). The Four Stages of National Research and Education Network Growth. *Information Technology Quarterly;* Summer 1991; 10(2): 5-11.

The development of NREN is set on a stages-of-growth model of technology absorption. Following this model, NREN would not be expected to reach maturity until after 2015, following continued rapid growth in this century and a period of slowed growth/increased control early in the next. A broad scan of possibilities for managed growth of NREN is given. The formation of coalitions, support and funding for all schools including K-12, use of currently unusued fiber optic networks, and promotion of broad access is suggested. Public funding support into the next century is urged, to prompt development of an information

industry, but this funding should focus on building and maintaining the network itself rather than on related services. NREN would become a public utility.

Hardie, Edward T. L.; Neou, Vivian. *Internet: mailing lists.* Menlo Park, California: SRI International; September, 1992: 337 p.

Hart, Michael S. (Executive Director, Project Gutenberg, Lisle, Illinois). Project Gutenberg: Access to Electronic Texts. *DATABASE;* December 1990; 13(6): 6-9.

Note: Communications to the author should be addressed to Michael S. Hart, Executive Director, Project Gutenberg, Illinois Benedictine College, Lisle, IL, 60532; No official connection to U. of Illinois--UIUC. Internet address: HART@vmd.cso.uiuc.edu; BITNET address: HART@UIUCVMD.BITNET.

Hawkins, Donald T. (AT&T Bell Laboratories). Whither A National Information Infrastructure? *ONLINE;* September, 1991; 15(5): 84-86.

Hazari, Sunil (West Virginia University). Using E-mail Across Computer Networks. *Collegiate Microcomputer;* August 1990; VIII(3): 210-214.

"To many educators, electronic mail has become as necessary as the mail delivered by the U.S. Postal service. The use of telecommunications technology to exchange mail, files and messages across different computer networks like INTERNET, BITNET, USENET, MCI mail, and CompuServe requires some understanding of networking addressing, gateways, and protocols. The purpose of this article is to provide information about and examples of sending mail across different computer networks."

Henderson, Carol C. (American Library Association, Washington Office). Washington Hotline. *College & Research Libraries News;* November 1989; 50(10): 923-924.

Note: Column describing NREN plans.

Henderson, Carol C. (American Library Association, Washington Office). Washington Hotline. *College & Research Library News;* March 1991; 52(3).

Note: Column regarding legislation for NREN.

Henry, Marcia Klinger. *Search sheets for OPACs on the Internet: A selective guide to U.S. OPACs utilizing VT100 emulation.* Henry, Marcia Klinger; Keenan, Linda; Reagan, Michael ed. Westport, CT; London: Meckler; 1991. 195 p.

Herzog, Kate (Science and Engineering Library, State University of New York at Buffalo). Collection Development for the Electronic Library. *Computers in Libraries;* November 1990; 10(10): 9-13.

Hobbs, Jim. National Research and Education Network (NREN). *LLA Bulletin;* Summer 1991; 54(1): 45-47.

Note: In column titled "New Technology."

Hodgson, Cynthia A. (ALCOA Technical Center). NREN: Why Special Librarians Should Care. *SpeciaList;* May 1992; 15(5): 1, 6.

"It will build upon and replace Internet, a conglomeration of over 1,000 existing networks that link more than 100,000 computers....Electronic mail connections between librarians in different organizations can

expand special librarians' already excellent networking capabilities and tendencies."

Hodson, James, Comp. The National Research and Education Network (NREN): A Bibliography; September 1991. Available from ERIC; ERIC number ED 344564.

Note: Abstract from ERIC.

"This bibliography brings together sources, through August 1991, on the National Research and Education Network (NREN) and related topics, including computer networks, databases, information technology, library automation, microcomputers, and online systems. Where possible, a brief biographical note on the author is included, and most of the entries are annotated. The list is alphabetical by author, and a source index citing the entry number follows the bibliography. The 255 references are taken from such publications as *Academic Computing, The Chronicle of Higher Education, Computerworld, EDUCOM Bulletin, EDUCOM Review, Library Hi Tech News, Network World, PC Week, Publishers Weekly, Scientific American, and Telecommunications.* Several congressional hearings are also cited, including those on computer networks and the High Performance Computing Act, as well as those concerning the NREN itself."

Hoffman, E.; Jackson, L. (Merit Network, Inc.; NASA). FYI on Introducing the Internet--A Short Bibliography of Introductory Internetworking Readings for the Network Novice; October 1992.

Note: Internet draft. Available for anonymous ftp from host cnri.reston.va.us, directory /internet-drafts; filename draft-ietf-userdoc2-fyi-novice-01.txt; file size 8643 bytes.

"This biliography offers a short list of recent information resources that will help the network novice become familiar with the Internet, including its associated networks, resources, protocols, and history. This FYI RFC includes references to free sources of information available on-line as well as more formal publications. A short section at the end includes information for accessing the on-line files. This FYI is intentionally brief so it can be easily used as a handout by user services personnel."

Hoffman, Lance J.; Clark, Paul C. (George Washington University). Imminent Policy Considerations in the Design and Management of National and International Computer Networks. *IEEE Communications Magazine;* February 1991; 29(2): 68-74.

Holden, Constance. Super Network Authorized. *Science;* December 1991; 254(5037): 1459.

On 22 November 1991 Congress passed the High-Performance Computing Act of 1991, authorizing up to $3 billion expenditure over the next 5 years.

Horwitt, Elisabeth (Computerworld). Science to take the high-speed route. *Computerworld;* August 14, 1989; 23(33): 1, 104.

Note: Article titled "Road construction still ahead" by Patricia Keefe, also on page 104, describes network traffic conditions.

Development of NREN is underway and Congressional approval is expected; the coming system will spark commercial services and permit closer scientific collaboration, but standards are needed to bring order from potential chaos.

House Science Committee (United States Congress). High Performance Computing Act of 1991. Washington, D.C.: United States Congress House Science Committee; May 7, 1991.

Note: H.R. 656.

House Science Committee, United States Congress. The High Performance Computing Act of 1991. Washington, D.C.: House Science Committee, United States Congress; 1991.

Note: Available via e-mail message "send nrenbill.txt" to nis-info@nis.nsf.net; file size 23117 bytes.

Huray, Paul G.; Nelson, David B. (University of South Carolina; Office of Energy Research, U.S. Department of Energy). The Federal High-Performance Computing Program. *EDUCOM Review;* Summer 1990; 25(2): 17-24.

Information Hotline. High-Performance Computing Act of 1991 Calls for an "Information President." *Information Hotline;* November 1991; 23(9): 6-8.

Information Technology and Libraries. Questions and Answers with Jane Ryland and Peter Young. *Information Technology and Libraries;* March 1992; 11(1): 51-54.

At the first annual VTLS Library Directors' Conference in September 1991, Peter Young, director of the National Commission on Libraries and Information Science, reported that a 1991 White House Conference organized by the Network Advisory Committee of the Library of Congress recommended that the network be available in all libraries and other information repositories, and at all levels. Making that promise a reality is the next task, Young added. Jane Ryland, president of the Association for the Management of Information Technology in Higher Education (CAUSE) said the copyright laws must change; Young agreed but could not immediately suggest clear ways to change them. Ryland noted the Elsevier experiment offering a set of serials for unlimited use for a single fee. Young noted the NREN development path must balance public interests against the need for private profit incentives, yet such balance is very hard to envision. Questioned as to whether NREN policy development is dominated by relatively few (190) research libraries, Ryland noted the broad membership of CAUSE and the mission of the Coalition for Networked Information. Asked about the new role of the librarian, Young agreed it is a teaching role; Ryland said librarians will decide how best to use the new technology.

Internet Activities Board. Ethics and the Internet: Network Working Group; January 1989; Request for Comments 1087. 2 pp.

Note: Available for anonymous ftp from host nic.ddn.mil, directory rfc; filename rfc1087.txt, file size 4510 bytes.

Internet Engineering Task Force. An Internet evolution plan for the IETF. Internet; 1991. 87 p.

Note: Available for anonymous ftp from host nsc.sri.com; directory /internet-drafts; filename draft-ietf-iesq-evolutionplan-00.txt, file size 196871 bytes.

This first draft of a plan for the Internet Engineering Task Force (IETF) is submitted by the Internet Engineering Steering Group of the IETF for review and comments by the entire group and the broader community, in order to keep the Internet design and management planning process open. Nine subjects are discussed: (1) goals and overall agenda; (2) uses and applications; (3) packet delivery; (4) network management; (5) operations requirements; (6) routing; (7) security; (8) transport protocols; (9) user services.

Internet Access Opening to OCLC, DIALOG, PaperChase, STN, NLM. *Database Searcher*; October 1991; 7(8):

32-33.

Note: In column titled "Search Services & Gateways."

Survey of costs and how to access EPIC, Grateful Med, STN International databases; notice of American Library Association's guide to library catalogs available on the Internet.

The Internet Gopher: An Information Sheet. *Electronic Networking: Research, Applications and Policy;* Spring 1992; 2(1): 69-71.

Note: Abstract from ERIC.

"This fact sheet about the INTERNET Gopher, an information distribution system combining features of electronic bulletin board services and databases, describes information availability, gateways with other servers, how the system works, and how to access Gopher. Addresses and telephone numbers for additional information or news about Gopher are included."

*Internet: Getting Started.* Marine, April ed. Menlo Park, CA: SRI International; 1992. 312 p.

This first document of SRI International's Internet Information Series aims to help the uninitiated learn what the Internet is, how it works, what its virtues are, and how they can join. It includes great depth of detail broadly organized into two sections: (1) how to join the Internet and (2) its history, basic concepts, organizations, and resources. Ten appendices include RFC Index, FYI Index, STD Index, GOSIP Document Information. The index to the volume itself is highly detailed, making it useful as a reference manual.

Jacob, M.E.L. Libraries and National Library Networks. *Bulletin of the American Society for Information Science;* June/July 1990; 16(5): 8-9.

Jacobs, Paul S.; Rau, Lisa F. (GE Research and Development Center, Schenectady, New York; GE Research and Development Center, Schenectady, New York). SCISOR: Extracting Information from On-line News. *Communications of the ACM;* November 1990; 33(11): 88-97.

"The future of natural language text processing is examined in the SCISOR prototype. Drawing on artificial intelligence techniques, and applying them to financial news items, this powerful tool illustrates some of the future benefits of natural language analysis through a combination of bottom-up and top-down processing."

Jacobsen, O. (Ole); Lynch, D. (Daniel) (Interop, Inc., Mountain View, California). A Glossary of Networking Terms: Network Working Group; March 1991; Request for Comments 1208. 18.

Note: Available for anonymous ftp from host nic.ddn.mil, directory rfc; filename RFC1208.TXT; file size 40146 bytes.

"This RFC is a glossary adapted from 'The INTEROP Pocket Glossary of Networking Terms' distributed at Interop '90. This memo provides information for the Internet community. It does not specify an Internet standard. Distribution of this memo is unlimited."

Jaschik, Scott. Senate Approves Big Computer Link for Colleges, Labs. *The Chronicle of Higher Education;* September 18, 1991; 38(4): A1.

"Passage of bill breaks logjam on creating national network."

Johnson, Johna Till (Data Communications, Gainesville, Florida). NREN: Turning the Clock Ahead on Tomorrow's Networks. *Data Communications;* September 1992; 21(13): 43-61.

Johnston, Donald H. (Columbia University School of International and Public Affairs). Networking for the Nation's Future. *Beyond Computing;* May/June 1992: 40-42, 44.

Note: Includes a sidebar on page 42 entitled "R&D for the 'superhighway'." NREN history is outlined, with quote from Sen. Gore on availability and possible economic applications of LandSat photos of Earth's surface. NREN development and public/private interaction should be tracked by information technology executives. Sidebar describes the Aurora testbed.

Jul, Erik (OCLC Online Computer Library Center, Inc., Dublin, Ohio). FTP: Full-Text Publishing? *Computers in Libraries;* May 1992; 12(5): 41-42.

Note: In column titled "Electronic Publishing."

Jul, Erik (OCLC Online Computer Library Center, Inc., Dublin, Ohio). Of Barriers and Breakthroughs. *Computers in Libraries;* March 1992; 12(3): 20-21.

Note: In column titled "Electronic Publishing."

Jul, Erik (OCLC Online Computer Library Center, Inc., Dublin, Ohio). Present at the Beginning. *Computers in Libraries;* April 1992; 12(4): 44-45.

Note: In column titled "Electronic Publishing."

Kahin, Brian. *Building Information Infrastructure.* McGraw-Hill; 1992. 443; ISBN: 0-390-03083-X.

Note: This book "consists of papers invited and commissioned by the John F. Kennedy School of Government at Harvard University on the creation of new forms of information infrastructure at the local, state, and national levels."

Kahin, Brian (John F. Kennedy School of Government, Harvard University). Information Policy and the Internet: Toward a Public Information Infrastructure in the United States. *Government Publications Review;* 1991; 18: 451-472.

"The development of an infrastructure of computer networks based on the present Internet is creating a versatile new environment for the dissemination of public information. At the same time, a new consensus on how information developed by the federal government should be disseminated suggests that government information, in its original form and as enhanced by the private sector, will be a driving force in expanding use of computer networks. These factors, along with the automation of agency information resources management, will blur the distinction between dissemination of information and access to information under the Freedom of Information Act. There is potential for closer communication between agencies and their public; however, intermediaries such as GPO and NTIS face an uncertain future."

Kahin, Brian (John F. Kennedy School of Government). Internet and the Libraries. *Information Technology Quarterly;* Winter 1991-92; 10(2): 29-31.

Note: Adapted from "The NREN as Information Market: Dynamics of Public, Private, and Academic

Publishing," a chapter in *Building Information Infrastructure* (New York: McGraw Hill, 1992).

Electronic information sharing via NREN prompts questions about whether individuals, institutions or libraries should be responsible for finding and paying for the use of this flowing information, who should be paid for it, and how these deserving might be located. Standards need to be set, taking into account the rights of information generators and the needs of users interacting in the dynamic networked arena where texts can appear in indeterminate numbers and forms. Libraries should collaborate with editors, research programs, and learned societies to organize this arena.

Kahle, Brewster (Thinking Machines Corp., Cambridge, Massachusetts). *Wide Area Information Server Concepts.* Cambridge, Mass.: Thinking Machines Corp.; 7/26/91 Draft. 24.

Note: Thinking Machines Technical Memo DR89-1. "Wide Area Information Servers answer questions over a network feeding information into personal workstations or other servers. As personal workstations become sophisticated computers, much of the role of finding, selecting, and presenting can be done locally to tailor to the users' interests and preferences. This paper describes how current technology can be used to open a market of information services that will allow user's workstation to act as librarian and information collection agent from a large number of sources. These ideas form the foundation of a joint project between Apple Computer, Thinking Machines, and Dow Jones. This document is intended for those that are interested in the theoretical concepts and implications of a broad-based information system. The paper is broken up in three parts corresponding to the three components of the system: the user workstation, the servers, and the protocol that connects them. Whereas a workstation can act as a server, and a server can request information from other servers, it is useful to break up the functionality into client and server roles. A final section in the appendix outlines related systems. Ideas for this have come from Charlie Bedard, Franklin Davis, Tom Erlickson, Carl Feynman, Danny Hillis, the Seeker group, Jim Salem, Gitta Salomon, Dave Smith, Steve Smith, Craig Stanfill, and others. I am acting as scribe. Comments are welcome (brewster@think.com)."

Kahle, Brewster; Medlar, Art (Thinking Machines Corporation; Scolex Information Systems). An Information System for Corporate Users: Wide Area Information Servers. *ONLINE;* September 1991; 15(5): 56-60.

Kahn, Robert E. (Corporation for National Research Initiatives (NRI)). A National Network: Today's Reality, Tomorrow's Vision, Part 2. *EDUCOM Bulletin;* Summer/Fall 1988; 23(23): 14-21.

Kalin, Sally W.; Tennant, Roy (Penn State University Libraries; University of California at Berkeley Library). Beyond OPACS...The Wealth of Information Resources on the Internet. *Database;* August 1991; 14(4): 28-33.

Kapor, Mitchell (Electronic Frontier Foundation). Building The Open Road: The NREN As Test-Bed For The National Public Network: Network Working Group; 1991; Request for Comments 1259.

Note: Available for anonymous ftp from host nnsc.nsf.net, directory rfc; filename rfc1259.txt, file size 26447 bytes.

Kapor, Mitchell (ON Technology, Inc.). Civil Liberties in Cyberspace. *Scientific American;* September 1991; 265(3): 158-164.

Kapor, Mitchell (Electronic Frontier Foundation; Chairman, Commercial Internet Exchange). Testimony before the United States House of Representatives Committee on Science, Space, and Technology Subcommittee on Science Hearing on the Management and Operation of the NSFNET by the National Science Foundation; March 12, 1992.

Note: Available for anonymous ftp from host nis.nsf.net; directory internet/legislative actions/hearing.12mar92; filename kapor.testimony; file size 25878 bytes.

The President of the Electronic Frontier Foundation (EFF) and Chairman of the Commercial Internet Exchange (CIX) describes these organizations and recommends the following objectives for the subcommittee: expand Internet/NREN access and commercial and non-commercial information sharing; encourage competition among carriers by broadening the NSF "acceptable use" policy; end government-supported access services, relying instead on the several private-sector access services; phase out NSFNET in favor of open market support of the backbone; support research toward a gigabit network (NREN), separating the research network and the current production network during NREN development insofar as possible; promote applications to serve a broader, less technically-oriented user base; broaden representation on the Network Advisory Committee.

Katz, James E.; Graveman, Richard F. (Bellcore, Morristown, New Jersey). Privacy Issues of a National Research and Education Network. *TELEMATICS and INFORMATICS;* 1991; 8(12): 71-120.

"The growing expectation that people are entitled to privacy in their electronic communications and to control who has access to them will at certain points conflict with the powers and capabilities of networks. In particular, a perennial conflict exists between privacy and reserve on the one hand and accessibility, data gathering, and efficient sharing of personal information on the other. While network capabilities exacerbate this perennial conflict, they can also help foster scientific cooperation if policies, technologies, and research environments are designed properly. Education too could be made more efficacious via a national research and education network (NREN) with appropriate privacy functionality. Based on an analysis of historical and contemporary practices, this article presents a variety of technical, managerial, and policy options to help secure these objectives."

Kay, Alan C. (Apple Computer Inc.). Computers, Networks and Education. *Scientific American*; September 1991; 265(3): 138-148.

"Globally networked, easy-to-use computers can enhance learning, but only within an educational environment that encourages students to question 'facts' and seek challenges."

Kehoe, Brendan P. Zen and the Art of the Internet. Widener University Computer Science Department: Brendan P. Kehoe; January 1992; c1992. 100.

Note: A Beginner's Guide to the Internet - First Edition; available for anonymous ftp from host ftp.cs.widener.edu, directory pub/zen; filenames zen-1.0.tar.Z, zen-1.0.dvi, zen-1.0.PS; also available for anonymous ftp from host aarnet.edu.au, directory pub/doc; filename zen-1.0.ps.Z; file size 492528.

Kesselman, Martin (Library of Science and Medicine, Rutgers University). The Internet. *Wilson Library Bulletin*; March 1992; 66: 76-78.

Note: Contained in column entitled "CD-ROM/Online Update."

Kibbey, Mark; Evans, Nancy H. (Carnegie-Mellon University; Carnegie-Mellon University). The Network is the Library. *EDUCOM Review;* Fall 1989; 24(3): 15-20.

"The ideal electronic library is a range of services and collections made accessible through networks."

King, Kenneth M. (EDUCOM). The NREN Picture Becomes Clearer. *EDUCOM Review;* July/August 1992;

27(4): 52.

Due to the Bush Administration's unwillingness to be seen as making industrial policy, federal leadership in appropriating funds authorized by the High-Performance Computing Act of 1991 is currently lacking. The NSF disavows any intention to build an information infrastructure; continued private industry and university investment in NREN appears its only hope at this time.

King, Kenneth M. (EDUCOM). Progress in Building a National Information Infrastructure. *EDUCOM Review;* Summer 1991; 26(2): 63-64.

"In the infrastructure arena, events in the coming year may well shape the technological landscape for higher education into the next century."

King, Tim (John Wiley & Sons, Inc., New York). Critical Issues for Providers of Network-Accessible Information. *EDUCOM Review;* Summer 1991; 26(2): 29-33.

"As publishers we are convinced that a satisfactory resolution will require the input, ideas, and insights of all parties."

Kochmer, Jonathan. NorthWestNet User Services Internet Resource Guide (NUSIRG). Bellevue, Washington: NorthWestNet Academic Computing Consortium, Inc.; 1991; c1991.

Note: Available via anonymous ftp from host ftphost.nwnet.net in directory /cd/nwnet/user-guide get README.nusirg to produce names of the files in the NUSIRG directory.

Koppel, Ted (Colorado Alliance of Research Libraries, Denver, Colorado). Public Access Catalogs Available Through Internet. *Colorado Libraries;* June 1990; 16(2): 31-33.

Note: Written under "BYTE Line" column, Ted Koppel, editor.

Kosmin, Linda J. (The Johns Hopkins University Applied Physics Laboratory). New Vistas in Full-Text Online Delivery: The Internet Connection. Williams, Martha E., ed. *Proceedings of the Thirteenth National Online Meeting, May 5-7, 1992, New York, NY.* Medford, New Jersey: Learned Information, Inc.; 1992: 189-193.

"The Internet facilitates high-speed transfer of professional communications, lengthy full-text publications, large datasets, some types of graphical displays, and numerous microcomputer software packages. Hundreds of files useful for library reference work are accessible across the Internet, often within moments, with little or no proprietary restrictions. This presentation focuses on various full-text resources available, strategies for facilitated file transfer (e.g., FTP), successful attempts at promoting single interface connectivity to information stored at multiple host sites, and some U.S. Government efforts to ensure broader access to their electronically formatted publications. Examples gathered for this paper were researched using the Macintosh System Software TCP/IP Connect II (Intercon Systems Corporation, Herndon, VA, USA)."

Kovacs, Diane K. (Kent State University Libraries). Directory of Scholarly Electronic Conferences.

Note: Available on BITNET by sending the following commands to listserv@kentvm.bitnet: GET ACADLIST FILE1; GET ACADLIST FILE2; GET ACADLIST FILE3; GET ACADLIST FILE4; GET ACADLIST FILE5; GET ACADLIST FILE6. File sizes: FILE1, 68002 bytes; FILE2, 55183 bytes; FILE3, 69589 bytes; FILE4, 60077 bytes; FILE5, 46052 bytes; FILE6, 31679 bytes; INDEX, 20957 bytes; README, 9242 bytes.

"This directory contains description of 715 electronic conferences on topics of interest to scholars. I have used my own judgement in deciding what is of scholarly interest--and accept any advice or argument about my decision. Also, I have placed the entries into categories by deciding what the *dominant* academic subject area of the electronic conference."

Krol, E. (University of Illinois - Urbana). The Hitchhikers Guide to the Internet: Network Working Group; September 1989. 24.

Note: Network Working Group Request for Comments 1118. Available for anonymous ftp from host nic.ddn.mil, directory rfc; filename rfc1118.txt, file size 61740 bytes.

Krol, Ed. *The Whole Internet: User's Guide & Catalog*. Loukides, Mike ed. Sebastopol, California: O'Reilly & Associates, Inc.; 1992; c1992.

This friendly instructional compendium of networked information resources helps organize the vast information sea of the Internet and points specifically to many of the unexpected jewels floating in it. Krol serves both the uninitiated who have used computers but need encouragement and practical tools for linking to and exploring the Internet, and experienced Internet travellers: four of the fifteen chapters focus on the hypertext World-Wide Web, WAIS, Gopher, and other applications. Resource sites are organized into 68 subject categories, from Aeronautics to Zymurgy: categories of special interest to librarians include "Freenets," where one can find how to organize local library Internet links and visit others; "Libraries"; "Library and Information Science"; and "Literature." Includes a brief history of the Internet; a glossary, index, quick reference card, and analytical table of contents permit use as a handbook.

Ladner, Sharyn J.; Tillman, Hope N. (University of Miami (FL) Richter Library; Babson College). How Special Librarians Really Use the Internet: Summary of Findings and Implications for the Library of the Future; 1992.

Note: Available for anonymous ftp from host hydra.uwo.edu, directory libsoft; filename spec_libs.txt, file size 26736 bytes.

Lamolinara, Guy. House Passes National Research and Education Network Bill. *Library of Congress Information Bulletin;* July 29, 1991; 50(15): 285.

Lane, Liz. Making the CompuServe-to-Internet Connection. *LITA Newsletter;* Spring 1991; 12(2, Issue 44): 22-23.

LaQuey, Tracy. *The Internet companion: A beginner's guide to global networking*. Tracy LaQuey with Jeanne C. Ryer. Reading, Mass.: Addison-Wesley; 1992.

Note: Abstract from the foreword by Al Gore.

"That is why I welcome publication of *The Internet Companion*. It provides a valuable primer on the Internet, explains the 'rules of the road,' and provides step-by-step instructions on accessing many of the information resources available through the Internet. It should help both new and experienced Internet users learn how to make the best use of the network."

LaQuey, Tracy (University of Texas at Austin). Networks for Academics. *Academic Computing*; November 1989; 4(3): 32-34+.

Histories, administration, protocols, hardware and services of four computer networks available in 1989 on

many U.S. campuses: BITNET, DECnet Internet, The Internet, and USENET.

LaQuey, Tracy L. *The User's Directory of Computer Networks.* Bedford, Mass: Digital Press; 1990.

Larsen, Ronald L. (University of Maryland at College Park). The Colibratory: The Network as Testbed for a Distributed Electronic Library. *Academic Computing;* February 1990; 4(5): 22-23, 35-37, 58.

Larsen, Ronald L. (University of Maryland at College Park). The Library as a Network-Based Information Server. *EDUCOM Review;* Fall/Winter 1991; 26(3/4): 38-44.

"It is clear that libraries and networks have become bedfellows whose futures are inextricably intertwined."

Laubach, Mark (Hewlett-Packard Company). Profile: CREN--The Corporation for Research and Educational Networking. *ConneXions;* May 1990; 4(5): 20-28.

Lincoln, Barbara (Thinking Machines Corp., Menlo Park, California). Wide Area Information Servers (WAIS) Bibliography. Menlo Park, California: Thinking Machines Corp.; 6/1/92.

Note: Available for anonymous ftp from host quake.think.com, directory pub/wais/wais-discussion; filename bibliography.txt; file size 11820 bytes.

"The following bibliography was distributed by Harry Morris of Thinking Machines at the SPIRES Workshop held in spring, 1992. Hard copies of the following documents are available. Some documents are available electronically, as stated, but might not contain figures in the ascii version. Email, fax, mail or phone your name, address and phone number to: Barbara Lincoln, Thinking Machines Corp., 1010 El Camino Real, Suite 310, Menlo Park, CA, 94205, phone: 415-329-9300, fax 415-329-9329, email:barbara@think.com."

Lincoln, Barbara. Wide Area Information Servers (WAIS) Bibliography. *Information Standards Quarterly;* July 1992; 4(3): 13-15.

Lippincott, Joan K. (Coalition for Networked Information). Coalition for Networked Information. *NFAIS Newsletter;* September, 1991; 33(9): 1, 116-117.

Lottor, M. (SRI International Network Information Systems Center). Internet Growth (1981-1991): Network Working Group; January 1991. 9 pp.

Note: Network Working Group Request for Comments 1296. Available for anonymous ftp from nic.ddn.mil, directory rfc; filename rfc1296.txt, file size 20104 bytes.

"This document illustrates the growth of the Internet by examination of entries in the Domain Name System (DNS) and pre-DNS host tables. DNS entries are collected by a program called ZONE, which searches the Internet and retrieves data from all known domains. Pre-DNS host table data were retrieved from system archive tapes. Various statistics are presented on the number of hosts and domains."

Lynch, Clifford A. (University of California, Oakland, California). From Telecommunications to Networking: The MELVYL® Online Union Catalog and the Development of Intercampus Networks at the University of California. *Library Hi Tech;* 1989; 7(26): 61-83.

Note: Sidebars by Mark H. Needleman.

"Over the past eight years, the MELVYL catalog has become one of the largest public access catalogs in the world, and now plays a central role in providing access to the library resources of the University of California. Currently, under heavy load, the MELVYL catalog supports many hundreds of simultaneous terminal connections, servicing over a quarter of a million queries a week and displaying more than two million records a week to its user community. This article discusses the history of the network that has supported the MELVYL catalog from the early days of its prototype to the present. It also describes both the current technical and policy issues that must be addressed as the network moves into the 1990s, and the roles that the network is coming to play in integrating local automation, the union catalog, access to resource databases, and other initiatives. Sidebars discuss the TCP/IP protocol suite, Internet protocol gateways, and Telenet and related inter-operability problems."

Lynch, Clifford A. (University of California, Oakland, California). The Growth of Computer Networks: A Status Report. *Bulletin of the American Society for Information Science;* June/July 1990; 16(5): 10-11.

Lynch, Clifford A. (Division of Library Automation, University of California Office of the President). Information Retrieval as a Network Application. *Library Hi Tech;* 1990; (4): 57-72.

Note: Issue 32. Sidebars by Mark Hinnebusch, Paul Evan Peters, and Sally McCallum.

"The nature of information retrieval applications, the Z39.50 protocol, and its relationship to other OSI protocols are described. Through Z39.50 a client system views a remote server's database as an information resource, not merely a collection of data. Z39.50 allows a client to build queries in terms of logical information elements supported by the server. It also provides a framework for transmitting queries, managing results, and controlling resources. Sidebars describe the Z39.50 Implementors Group, the Z39.50 Maintenance Agency, and international standards for OSI library application protocols."

Lynch, Clifford A. (University of California, Oakland, California). Library Automation and the National Research Network. *EDUCOM Review;* Fall 1989; 24(3): 21-26.

"With MELVYL, a researcher can obtain a summary of all 127 seventeenth-century publications in Portuguese with a single command."

Lynch, Clifford A. (University of California, Oakland, California). Linking Library Automation Systems in the Internet: Functional Requirements, Planning, and Policy Issues. *Library Hi-Tech;* 1989; 7(4): 7-18.

"Historically, library catalogs have been rather insular, often based on specialized hardware and/or operating systems lacking industry-standard networking capabilities. Network access was not a major consideration in the design or selection of these specialized systems. But when library automation systems are attached to the network as an afterthought, they often display unsatisfactory functional characteristics; libraries now face the realities of the wired campus environment and the collision between library automation tradition and the new world of networks."

Lynch, Clifford A. (The University of California, Oakland, California). Online Catalogs and the National Internet. Washington, D.C.; June 8, 1989.

Note: Paper distributed at a meeting in Washington, D.C.

Lynch, Clifford A. (Division of Library Automation, Office of the President, University of California, Oakland, California). The Z39.50 Information Retrieval Protocol: An Overview and Status Report. *Computer Communication Review;* January 1991; 21(1): 58-70.

Note: Published by ACM SIGCOMM.

Lynch, Clifford A.; Preston, Cecilia M. (University of California, Oakland, California; University of California, Berkeley). Evolution of Networked Information Resources. Williams, Martha E., ed. *Proceedings of the Twelfth National Online Meeting, May 7-9, 1991, New York, NY.* Medford, New Jersey: Learned Information, Inc., 1991; 221-230.

"An overview and taxonomy of networked information resources is presented here, which explains current resources and resource development activities as well as current trends, including the identification of key technology developments that will bring us to the next stages of the evolutionary process of networked communication. The Internet is the product of over 20 years of research and innovation in computer communications technology, beginning with the ARPANET in 1969, and today connecting hundreds of thousands of users on thousands of interlinked networks, worldwide. The future of networked information resources is now embodied in the vision and political movement that is the National Research and Education Network (NREN), originally introduced to the Congress by Senator Albert Gore and represented in the current federal administration budget for FY 1992 as part of the High Performance Computing Initiative. The NREN is enthusiastically supported by a coalition of higher education and information/library organizations, including EDUCOM, CAUSE, NASLGC, ALA, and ARL. Three major types of network services available to most Internet users are discussed: electronic mail, file transfer, and remote logon. In addition, the available classes of Internet information resources are described: remote terminal access, electronic mail-based services; and file-transfer-based services. Finally, looking towards future information resources, we discuss the influences of the increasing use of workstations with bit-mapped displays and the movement towards distributed computing, which will require new network protocols. The two models for the relationship between user workstations and network information resources are the use of the workstation as a graphical display device through the X windows protocol and the use of workstations as part of a true distributed computing environment. The evolutionary potentials of these models are evaluated. In reviewing the history of networked information and looking ahead to the next generation of information resources and technology, we see that while yesterday's technology was built really without considering the implications of the network, tomorrow's generation of information resources are being designed specifically for the evolving networked environment."

Lynch, Clifford A.; Preston, Cecilia M. Internet Access to Information Resources. *Annual Review of Information Science and Technology (ARIST).* Williams, Martha E. ed.: Elsevier Science Publishers B.V.; 1990; 25: 263-312.

Note: Includes bibliography.

Lynch, Daniel C.; Rose, Marshall T. *Internet system handbook.* Reading, Mass.: Addison-Wesley; 1992.

Machovec, George S. (Arizona State University, Tempe, Arizona). Internet Access to Library Online Catalogs. *Online Libraries and Microcomputers;* January 1990; 8(1): 1-4.

Machovec, George S., Managing Editor (Arizona State University, Tempe, Arizona). National Research and Education Network (NREN). *Online Libraries and Microcomputers;* October 1990; 8(10): 1-4.

Machovec, George S. (Arizona State University, Tempe, Arizona). Navigating the Internet: Library Systems and Database Limitations. *Online Libraries and Microcomputers;* June 1992; 10(6-7): 1-3.

Malinconico, S. Michael (School of Library and Information Studies, University of Alabama, Tuscaloosa). Information's Brave New World. *Library Journal;* May 1, 1992; 117(8): 36-40.

"Librarians can deny change or anticipate it and exploit it to their advantage."

Malkin, G. (Xylogics). Who's Who in the Internet: Biographies of IAB, IESG and IRSG Members: Network Working Group; May 1992; Request for Comments 1336; FYI 9. 33.

Note: Available for anonymous ftp from host nic.ddn.mil, directory rfc; filename rfc1336.txt, file size 92119 bytes.

"This FYI RFC contains biographical information about members of the Internet Activities Board (IAB), the Internet Engineering Steering Group (IESG) of the Internet Engineering Task Force (IETF), and the Internet Research Steering Group (IRSG) of the Internet Research Task Force (IRTF)."

Malkin, G.; Marine, A. (Xylogics; SRI). FYI on Questions and Answers: Answers to Commonly asked "New Internet User" Questions: Networking Working Group; May 1992 [Obsoletes RFC 1206 of February 1991]; Request for Comments 1325; FYI 4; 42.

Note: Available for anonymous ftp from host nic.ddn.mil, directory rfc; filename rfc1325.txt, file size 91884 bytes.

"This FYI RFC is one of two FYI's called, "Questions and Answers" (Q/A), produced by the User Services Working Group of the Internet Engineering Task Force (IETF). The goal is to document the most commonly asked questions and answers in the Internet."

Malkin, G.; Parker, T. (Xylogics; UTexas). Internet Users' Glossary: Network Working Group; August 1992.

Note: Internet draft. Available for anonymous ftp from host cmi.reston.va.us, directory /internet-drafts; filename draft-ietf-userglos-glossary-00.txt; file size 98729 bytes.

"There are many networking glossaries in existence. This glossary concentrates on terms which are specific to the Internet. Naturally, there are entries for some basic terms and acronyms because they are referenced by other entries."

Maloff, Joel H. (CICNet, Inc. Computing Center). The emergence of the National Research and Education Network (NREN) and its implications for American telecommunications. Garodnick, Joseph [and others], eds. *Fiber networking and telecommunications*. Proceedings of SPIE, the International Society for Optical Engineering, September 5-8, 1989, Boston, Massachusetts. Bellingham, Washington: SPIE; 1990;

"The nation which most completely assimilates high performance computing into its economy will very likely emerge as the dominant intellectual, economic, and technological force in the next century," Senator Albert Gore, Jr., May 18, 1989, while introducing Senate Bill 1067, "The National High Performance Computer Technology Act of 1989". A national network designed to link supercomputers, particle accelerators, researchers, educators, government, and industry is beginning to emerge. The degree to which the United States can mobilize the resources inherent within our academic, industrial and government sectors towards the establishment of such a network infrastructure will have direct bearing on the economic and political stature of this country in the next century. This program will have significant impact on all forms of information transfer, and peripheral benefits to all walks of life similar to those experienced from the moon landing program of the 1960's. The key to our success is the involvement of scientists, librarians, network designers, and bureaucrats in the planning stages. Collectively, the resources resident within the United States are awesome; individually, their impact is somewhat more limited. The engineers, technicians, business people, and educators participating in this conference have a vital role to

play in the success of the National Research and Education Network ((NREN)."

Malone, Thomas W.; Rockart, John F. (Massachusetts Institute of Technology). Computers, Networks and the Corporation. *Scientific American;* September 1991; 265(3): 128-136.

"Computer networks are forging new kinds of markets and new ways to manage organizations. The result will be a major change in corporate structure and management style."

Markoff, John. For the PC User, Vast Libraries. *The New York Times.* New York, New York; July 3, 1991; C: 1, 5.

Growth in the market for fulltext retrieval of documents has been prompted by Thinking Machines Corporation (TMC) of Cambridge, Mass. TMC developed WAIS (Wide Area Information Servers), which permit users to look at the full contents of books and call up sound, words, and pictures on their computer screens. TMC has offered the WAIS system at no charge in order to prompt correlative developments in the information industry. Users of Apple personal computers can use WAIS via the Internet and TMC supercomputers to search the full texts already available on Dow Jones and on several other huge private and public databases. Apple's Advanced Technology Group--who cooperated with TMC, KPMG Peat Marwick, and Dow Jones to support creation of WAIS--expect that retrieval software will soon be standard on personal computers and that NREN will lower the cost of searches and expand to schools. Apple researchers are enhancing WAIS, e.g., adding the capability for users to build their own electronic newspapers. WAIS is based on the Z39.50 protocol, which is now also supported by Library of Congress, Sun Microsystems, Next, and Mead Data Central.

Markoff, John. Sharing the Supercomputers. *The New York Times.* New York, New York; December, 29, 1988; D: 1+.

Marmion, Dan. E-Conference to Coincide with Research Project. *OCLC Micro*; December 1991; 7(6): 7-8.

Note: Contained in column entitled "OCLC News."

Marmion, Dan. OCLC and the Internet. *OCLC Micro;* December 1991; 7(6): 7.

Note: In column titled "OCLC News."

"OCLC Users Council concluded that use of Internet to deliver OCLC service is not planned for the immediate future due to considerations of reliability and economics. A test conducted with LincNet in North Carolina may be repeated after installation of OCLC's New Network is completed in 1992. A full copy of the report is available in Users Office at OCLC."

Marshall, Eliot. NSF opens high-speed computer work. *Science.;* January 6, 1989; 243; 22-23.

Martin, J. (Jerry) (The Ohio State University). There's Gold in them thar Networks! or Searching for Treasure in all the Wrong Places: Network Working Group; December 1991; Request for Comments 1290; FYI 10. 27.

Note: Available for anonymous ftp from host ftp.utexas.edu, directory pub/netinfo/rfc; filename RFC1290.TXT; file size 46997 bytes.

"This document was presented at the 1991 ACM SIGUCCS User Services Conference. It appears here in its updated form. There is a wealth of information on the network. In fact, so much information, that you could spend your entire life browsing. This paper will present some of the "gold nuggets" of information and file repositories on the network that could be of use to end users. The ultimate goal is to make the

route to these sources of information invisible to the user. At present, this is not easy to do. I will explain some of the techniques that can be used to make these nuggets easier to pick up so that we can all be richer."

Massey, Walter E. (National Science Foundation). NSF's Role in the National Research and Education Network. *EDUCOM Review;* Summer 1991; 26(2): 34-36.

Note: Author is Director of the National Science Foundation.

"We will work to create a national network council that will bring federal, academic, and industry leaders together to oversee the NREN."

McAdams, Alan, K. [and others] (Johnson Graduate School of Management, Cornell University). Economic Benefits and Public Support of a National Education and Research Network. *EDUCOM Bulletin;* Summer/Fall 1988; 23(3): 63-64.

McAnge, Thomas R., Jr. [and others] (Virginia Cooperative Extension; Virginia Polytechnic Institute and State University). A Survey of Educational Computer Networks; June 1990. 133 pages.

McClure, Charles R. From the Editor: The High Performance Computing Act of 1991. *Electronic Networking: Research, Applications and Policy;* Spring 1992; 2(1): 2-9.

Note: Abstract from ERIC.

"Discusses issues related to the High Performance Computing and Communication program and National Research and Education Network (NREN) established by the High Performance Computing Act of 1991, including program management, specific program development, affecting policy decisions, access to the NREN, the Department of Education role, and dissemination of government information. A copy of the law is appended."

McClure, Charles R. (Syracuse University). Librarians informing the future. *Library Journal;* April 1, 1992; 117(6): 8.

Note: In "Letters to the Editor."

McClure, Charles R. [and others]. *The National Research and Education Network (NREN): Research and Policy Perspectives.* Norwood, NJ: Ablex Publishing Corporation;1991.

700-page compendium of the full texts of historical documents (with numbered lines for easy reference) from US Congress; user perspectives; recommendations; analyses of effects on research and education; benefits; networks; and policy debates surrounding the NREN. Analytical table of contents, appendices, and index facilitate searching for specific topics.

McClure, Charles R. (Syracuse University). Planning and Evaluation for the Networked Environment. *EDUCOM Review;* Fall/Winter 1991; 26(3/4): 34-37.

McClure, Charles R. (School of Information Studies, Syracuse University, Syracuse, New York). Public Libraries and the Internet/NREN: New Challenges, New Opportunities. Syracuse, New York: Syracuse University; July 1, 1992. 40 pp.

Note: "Copies of this report can be obtained from the Publications Office, School of Information Studies,

Syracuse University, Syracuse, NY 13244-4100 (315)443-2911) for $15 (includes postage and handling)."

"This paper provides findings from a study sponsored by OCLC, Inc. to explore key issues and possible roles for the public library in the evolving networked environment."

McClure, Charles (School of Information Studies, Syracuse University, New York). A User Perspective on Developing Internet Services. *Computers in Libraries;* April 1992; 12(4): 53-55.

Note: In column titled "R&EN Transcripts."

McCone, Gary K.; Starr, Daniel O. (National Agricultural Library, Beltville, Maryland). Document Delivery Using Image Transmission Over Internet: A Pilot Project at the National Agricultural Library. Henderson, Diane, ed. *ASIS '90: Proceedings of the 53rd ASIS Annual Meeting, Toronto, Ontario, November 4-8, 1990, Toronto, Ontario*. Medford, New Jersey: Learned Information, Inc.; 1990; 27: 36-38.

"The National Agricultural Library and the North Carolina State University Libraries are investigating the potential for using the National Science Foundation's high speed Internet telecommunications system, which connects almost all major U.S. universities, to immediately send digitized page images of requested documents to the university libraries. This methodology could prove to be invaluable in providing timely nationwide access to information in remote locations. The project is investigating transmitting both compressed and uncompressed files and evaluating various methods of providing final document delivery to the end user on campus including Local Area Networks. Once the technical details of transmitting and displaying the page images are worked out, the project will evaluate the potential for incorporating such a system into a library's inter-library loan procedures."

McGill, Michael J. (Online Computer Library Center, Inc.). Z39.50 Benefits for Designers and Users. *EDUCOM Review;* Fall 1989; 24(3): 27-30.

Metz, Paul; Gherman, Paul M. (Virginia Polytechnic Institute and State University Libraries, Blacksburg, Virginia). Serials Pricing and the Role of the Electronic Journal. *College & Research Libraries;* July 1991; 52(4): 315-327.

Note: This article is the third part of a series on scholarly communications and serials prices.

"The rapid escalation of serials prices is a serious threat to the system of scientific and scholarly communication. The growth of science, the increase in commercial publishing, and the inherent monopolies enjoyed by journals help account for this problem. Changes in academic reward structures and cooperative action by librarians, individual scientists and scholars, scholarly societies, and university presses are needed. The electronic journal may have a powerful role to play in combating serials inflation if its evolution is shaped thoughtfully and by the right hands."

Metz, Ray. *Directory of Directories on the Internet*. Westport, CT: Meckler; 1992. 175 p.

Mitchell, Maurice; Saunders, Laverna M. (University of Nevada, Las Vegas). The Virtual Library: An Agenda for the 1990s. *Computers in Libraries;* April 1991; 11(4): 8-11.

Morin, Richard (Canta Forda Computer Laboratory). Use the Net, Luke. *SunExpert Magazine;* December 1990; 1(14): 37-41.

Morrison, Margaret (University of Chicago, Regenstein Library). Electronic Scholarly Journals. *Information Standards Quarterly;* January 1991; 3(1): 9-10.

National Research Network Review Committee. *Toward A National Research Network.* Washington, D.C.: National Academy Press; 1988. 55.

National Science Foundation Network Service Center (BBN Systems and Technologies Corporation). Internet Resources Guide; 1989.

Note: Available for anonymous ftp from host NNSC.NSF.NET, directory RESOURCE-GUIDE. Also available via e-mail from RESOURCE-GUIDE-REQUEST@NNSC.NSF.NET. This is a large file which will generally be sent in parts. Helpful instructions and a table of contents of the guide can be obtained via e-mail from INFOSERVER@NNSC.NSF.NET; message (line 1) REQUEST: RESOURCE-GUIDE (line 2) TOPIC: RESOURCE-GUIDE-HELP (line 3) REQUEST: END.

Neff, Raymond K. (University of California at Berkeley). Merging Libraries and Computer Centers: Manifest Destiny or Manifestly Deranged? An Academic Services Perspective. *EDUCOM Bulletin;* Winter 1985; 20(4): 6-16.

Negroponte, Nicholas P. (Media Laboratory of the Massachusetts Institute of Technology). Products and Services for Computer Networks. *Scientific American;* September 1991; 265(3): 106-113.

Nickerson, Gord (Elborn College, University of Western Ontario). Computer Mediated Communication on BITNET. *Computers in Libraries;* February 1992; 12(2): 33-36.

Note: In column titled "Networked Resources."

Nickerson, Gord (School of Library and Information Science, Elborn College, University of Western Ontario). Effective Use of Usenet. *Computers in Libraries;* May 1992; 12(5): 38-40.

Note: In column titled "Networked Resources."

Nickerson, Gord (School of Library and Information Science, Elborn College, University of Western Ontario). File Transfer Protocol. *Computers in Libraries;* October 1991; 11(9): 51-53.

Note: In column titled "Networked Resources."

File Transfer Protocol (FTP) is a widely-used program that applies the TCP/IP protocol, the grandaddy of connectivity. FTP lives in several versions, but its principal commands (listed here) are alike. Vast hordes of archives holding files that can be downloaded are available via anonymous FTP; directions are given to some major ones.

Nickerson, Gord (University of Western Ontario). Getting to Know Wide Area Information Servers. *Computers in Libraries;* October 1992; 12(9): 53-55.

Note: In column titled "Networked Resources."

"You can try WAIS without installing any software. Telnet to QUAKE.THINK.COM and log in as WAIS. A password is not required but enter your e-mail address and terminal type (most will be vt100). You are then connected to the SWAIS client program and a list of 283 databases is displayed. Each database name corresponds to a source. Select a database and try a search. This is a good way of familiarizing yourself with what is available--everything from recipes to library catalogs."

Nickerson, Gord (School of Library and Information Science, Elborn College, University of Western Ontario). The Internet. *Computers in Libraries;* September 1991; 11(8): 25-29.

Note: In column titled "Networked Resources."

Nickerson, Gord (School of Library and Information Science, Elborn College, University of Western Ontario). Listservers. *Computers in Libraries;* March 1992; 12(3): 13-18.

Note: In column titled "Networked Resources."

Nickerson, Gord (School of Library and Information Science, Elborn College, University of Western Ontario). Local Databases. *Computers in Libraries;* January 1992; 12(1): 37-39.

Note: In column titled "Networked Resources."

Local libraries at Texas A&M and the University of Saskatchewan allow remote Internet users to access the commercial databases, e.g. Wilson, that are available on their systems. Details are provided for accessing these local systems. Since most organizations would not depend on this remote access (for which the local systems offer no support) but would be likely to buy a much-used service or product, database producers and system managers should be less fearful of loss of revenue and control. The rules of etiquette require that remote users connect after the local system's working hours.

Nickerson, Gord (School of Library and Information Science, Elborn College, University of Western Ontario). Remote Log-in with Telnet. *Computers in Libraries;* November 1991; 11(10): 25-26.

Note: In column titled "Networked Resources."

Detailed instructions for remote log-on to any machine on the Internet via Telnet, a virtual computer interface based on TCP/IP that leaves the work of matching baud rate and other settings to the two computers that need to communicate. Telnet is available in several versions: on UNIX as part of the operating system; through many vendors for VAX or IBM; and public domain versions for MS-DOS, Windows 3.0 and Macintosh. Telnet Driver 1.0 and Kermit 3.11 are more sophisticated alternatives.

Nickerson, Gord (School of Library and Information Science, Elborn College, University of Western Ontario). Types of Databases. *Computers in Libraries;* December 1991; 11(11): 38-42.

Note: In column titled "Networked Resources."

Databases on the Internet can permit interactive access, or provide data files, or provide electronic mail access to batch files. Descriptions, addresses and passwords are given for the interactive databases. These include online public access catalogs (OPACs) like the Colorado Alliance of Research Libraries; campuswide information systems (CWIS) like Cornell's CUINFO; bulletin board systems (BBS) like the Cleveland Freenet; wide area information servers (WAIS) that permit searching and accessing many databases; and a group of miscellaneous other systems like NASA.

Nickerson, Gord (School of Library and Information Science, Elborn College, University of Western Ontario). Usenet. *Computers in Libraries;* April 1992; 12(4): 31-34.

Note: In column titled "Networked Resources."

Nielsen, Brian (Northwestern University Library, Evanston, Illinois). The Coalition for Networked Information:

Realizing the Virtual Library. *ONLINE;* September 1991; 15(5): 96-97.

Note: In column titled "pc monitor."

Nielsen, Brian (Northwestern University Library). Finding It On The Internet: The Next Challenge for Librarianship. *Database;* October 1990; 13(5): 105-107.

Noonan, Dana (Metropolitan State University). A Guide To Internet/Bitnet. Metronet: Metropolitan State University; June 1992.

Note: Available for anonymous ftp from host hydra.uwo.ca, directory libsoft; filenames guide1.txt (contains everything except the list of library connections), guide2.txt (contains only the Internet library list); file sizes 56098, 64882 bytes.

Noonan, Dana (Metropolitan State University). Internet Libraries. Metronet; October 1991.

Note: Available for anonymous ftp from host hydra.uwo.ca, directory libsoft; filename INTERNET_LIBS.TXT, file size 55498 bytes.

Notess, Greg R. (Montana State University). Gaining Access to the Internet. *ONLINE;* September 1992; 16(5): 27-34.

The NREN Enigma: A New National Network? *Telecommunications, North American Edition;* January 1991; 25(1): 13-14.

NREN, electronic library systems, and information services are topics at CNI meeting. *College and Research Libraries News;* June 1991; 52(6): 384.

Oberst, Daniel J.; Smith, Sheldon B. (EDUCOM Networking Activities; EDUCOM Bulletin). BITNET: Past, Present, and Future. *EDUCOM Bulletin;* Summer 1986; 21(2): 10-17.

Ochs, Mary. New Technologies for Document Delivery and the Barriers to Their Use in the Developing Countries. *Quarterly Bulletin of the International Association of Agricultural Information Specialists;* 1991; 36(1-2): 118-121.

"Telefacsimile, computer networks, and optical scanning hold great potential for rapid document delivery. Most large libraries in the United States have purchased fax machines in the past two years. However, costs, labor, speed of transmission and quality of transmission have all surfaced as issues in the use of fax. Because of these issues, more sophisticated technologies, such as high speed networks and optical scanning are being investigated for use in document delivery. Several projects are now underway in the U.S. to combine optical scanning and network transmission for document delivery. The United States National Agricultural Library and the Research Libraries Group are both conducting tests on document transmission via the Internet. These projects are described briefly. Some of the barriers to the use of scanning, network transmission and fax in the developing countries, such as high costs and dependence on high speed telecommunications, will be discussed."

OCLC Ponders Role in Changing Network Environment. *Library Hi Tech News;* September 1990; (74): 20.

Odin [Granrose, Jon]. Anonymous FTP: questions, answers, etc.; January 5, 1990.

Note: Available for anonymous ftp from host pilot.njin.net, directory pub/ftp-list; filename ftp.help; file

size 7701 bytes.

Palca, Joseph (Science Magazine). BITNET Headed for New Frontiers. *Science;* February 2, 1990; 247(4942): 520.

Palca, Joseph. Getting Together Bit by Bit. *Science;* April 13, 1990; 248: 160-162.

Note: In column titled "Research News."

Panel on Information Technology and the Conduct of Research. *Information Technology and the Conduct of Research: The User's View.* Washington, D.C.: National Academy Press; 1989; 72 pp.

Parker, Elliott (Central Michigan University). Computer Networking Bibliography.

Note: Available by sending e-mail to COMSERVE@RPIECS.BITNET and putting only one line, SEND COMPUNET BIBLIO, in the body; file size 24773 bytes.

Parkhurst, Carol A., Editor. *Library Perspectives on NREN.* Chicago, Illinois: Library and Information Technology Association, a Division of the American Library Association; 1990; 75 pp.

Patrick, Doyle (Pacific Bell). K-12: Linking to the National Networks. *Computers in Libraries;* May 1992; 12(5): 61-62.

Note: In column entitled "R&EN Transcripts."

Perry, Andrew (State University of New York at Binghamton). NYSERNet (sm) New User's Guide to Useful and Unique Resources on the Internet. Syracuse, New York: NYSERNet, Inc.; 1991; ver. 2.2.

Note: Available for anonymous ftp from host nysernet.org, directory pub/guides; filename Guide.V.2.2.text; file size 315248 bytes.

Perry, Dennis G. [and others] (Unisys Corporation; BBN Laboratories, Inc.; BBN Communications Corporation). The ARPANET and the DARPA Internet. *Library Hi Tech;* 1988; 6(2): 51-62.

Note: Issue 22.

"The ARPANET, initiated in 1969 by the Advanced Research Projects Agency (DARPA) of the Department of Defense (DoD), was the first wide area packet switching network. In 1984, the ARPANET, which had grown to over 100 nodes, was separated into two parts: an operational component, the MILNET, to serve the operational needs of the DoD, and a research component that retained the ARPANET name. After the network split, the MILNET expanded, and it should reach over 250 nodes within a year. The DARPA Internet was formed in the 1970s in response to a requirement to interconnect different types of packet-switching networks that were being implemented. It has grown to be very large; it now consists of over 330 networks, hundreds of gateways, and tens of thousands of hosts. Where the ARPANET used to connect hosts that were single computers into a network, many of these hosts now serve as gateways to local campus networks, regional networks, and other national networks, such as the NFSNET. The impact of this growing system of interconnected networks on research, communications, and library access will be profound."

Peters, Paul Evan. Fall 1991 CNI Task Force. *Information Technology and Libraries;* March 1992; 11(1): 36-39.

Note: Abstract from ERIC.

"Presents a summary report of the fall 1991 meeting of the Task Force of the Coalition for Networked Information (CNI). Topics discussed include the flow of networked information; perspectives from the humanities, arts, and social sciences; the potential economic importance of NREN (National Research and Education Network); and information policies."

Peters, Paul Evan (Coalition for Networked Information (CNI)). Networked Information Resources and Services: Next Steps. *Computers in Libraries;* April 1992; 12(4): 46-53.

Note: In column titled "R&EN Transcripts."

Peters, Paul Evan (EDUCOM/CAUSE/ARL Coalition for Networked Information (CNI)). Network Navigating and Navigators. *EDUCOM Review;* July/August 1992; 27(4): 40-42.

Summaries of presentations by Vinton Cerf, Brewster Kahle, Joyce Reynolds, George Strawn, and others at the Spring 1992 meeting of the Coalition for Networked Information Task Force, held in Washington, D.C. in March. Among other speakers were Pat Moholt, associate director of libraries at Rensselaer Polytechnic Institute, who urged investment in human resources because cultural norms and professional expectations are harder to change than technologies or tasks; and Wayne P. Kelley, assistant public printer and superintendent of documents at the U.S. Government Printing Office (GPO), who described the GPO's major transition to include electronic publishing and multimedia dissemination of information.

Peters, Paul Evan (EDUCOM). Perceptions of the National Networked Information Environment. *EDUCOM Review;* May/June 1992; 27(3): 22-23.

Planka, Daniela (National Library of Canada). Network Directory Services. *Library Hi Tech;* 1990; 32(4): 93-103.

The Directory (CCITT X.500/ISO 9594) is an international standard, which was ratified jointly by ISO and CCITT in December 1988. The standard describes the structure and services of a global, logically centralized but physically distributed, electronic network directory that will support the evolving telecommunications environment. Directory pilot projects are underway in both North America and Europe and commercial implementations of the Directory standard are becoming increasingly available. As the bibliographic community becomes more dependent on the use of networks, it is essential that library professionals understand the capabilities of this powerful new standard.

Polly, Jean Armour (Liverpool (New York) Public Library). Surfing the Internet: An Introduction. *Wilson Library Bulletin;* June 1992; 10(66): 38-42, 155.

Porter, Donald D. (Technical Services in Information Technology Services, Rensselaer Polytechnic Institute). Information Retrieval for the NSFNET Community. *EDUCOM Bulletin;* Summer/Fall 1988; 23(2/3): 59-62.

Quarterman, John S. *The Matrix: Computer Networks and Conferencing Systems Worldwide*. Bedford, Massachusetts: Digital Press; 1990; c1990. 719 pages.

World guide to networks and conferencing systems describes what and where the world and country networks are, how to get to them, and what their limits are. Numbered sections and a 70-page index permit readers to find specifics quickly. The preface describes how the network has been used to inform the world immediately of newsworthy events, illustrating how the global village works in the electronic age. Appendices describe public data networks and laws relating to computer communication.

Quinn, Judy; Rogers, Michael. Congress Acts on Library Issues. *Library Journal;* August 1991; 116(13): 14-15.

Political interactions in Congress during July 1991 at ALA Annual Conference and White House Conference on Library and Information Science, included passage of HR 656, High Performance Computing Act of 1991, that starts development of NREN. HR 2772 proposes Wide Information Data Network Online (WINDO) to assure public access to government information while accomplishing paperwork reduction. Protest by information-related industries and associations against proposed HR 534 (that would impose $21/hr royalty/user tax on public users of Federal Maritime Commission online database) unites organizations with otherwise diverse agendas in support of free access.

Quint, Barbara (Editor of Database Searcher). Online Meets the Internet. *Wilson Library Bulletin;* March 1992; 66: 78-80.

Note: In column titled "Connect Time."

Ra, Marsha. Technology and Resource Sharing: Recent Developments and Future Scenarios. Cargill, Jennifer; Graves, Diane. eds. *Advances in Library Resource Sharing*. Westport, CT: Meckler Publishing; 1990; 1: 141-153.

Raeder, Aggi W.; Andrews, Karen L. (UCLA Engineering and Mathematical Sciences Library, Los Angeles, California). Searching Library Catalogs on the Internet: A Survey. *Database Searcher;* September 1990; 6(7): 16-31.

Note: Includes survey/directory of Internet access to library catalogs.

Ratzan, Lee (University of Medicine and Dentistry of New Jersey, Piscataway). Building an Internet Browser. *UNIX Review;* January 1992; 10(1): 25-29.

The Regents of the University of California at Davis. Mining the Internet. Davis, California: The Regents of the University of California at Davis; 1991.

Note: Available for anonymous ftp from host ucdavis.edu, directory UCD.NETDOCS; filename MINING; file size 118630 bytes (PostScript version).

Request for Support of Legislation. *EDUCOM Review;* Spring 1991; 26(1): 11-13.

Note: Article reprints letter sent by EDUCOM President Kenneth M. King to the Senate Commerce, Science and Transportation Committee; the Senate Labor and Human Resources Committee; the Senate Energy and Natural Resources Committee; the House Science, Space, and Technology Committee; and the House Education and a Labor Committee in order to request support of legislation for a high-capacity national computer network. A policy framework is described.

Research & Education Networking. Creating the NREN Network Information Center. *Research & Education Networking;* June/July/August 1991; 2(5&6): 10-12.

Research & Education Networking. The Internet Society. *Research & Education Networking;* June/July/August 1991; 2(5&6): 16-18.

Rickard, Jack (Boardwatch Magazine). Colorado Supernet Offers Public Access to Internet. *Boardwatch Magazine;* March 1991; V(3): 16-21; ISSN: 1054-2760.

RLG. RLG Introduces Document Transmission System for the Internet. *ALCTS Newsletter;* 1992; 3(2): 15.

"Using standard PC hardware, Ariel produces images of much greater resolution than fax machines."

Roberts, Lawrence G.; Wessler, Barry D. (Advanced Research Projects Agency, Washington, DC). Computer network development to achieve resource sharing. *AFIPS Conference Proceedings: 1970 Spring Joint Computer Conference, May 5-7, 1970, Atlantic City, New Jersey.* Montvale, New Jersey: AFIPS Press; 1970; 36: 543-546.

Roberts, Michael M. (EDUCOM). The Global Internet and the NREN. *EDUCOM Review;* Winter 1990: 8-9.

Roberts, Michael M. (EDUCOM). The NREN and Commercial Services. *EDUCOM Review;* Winter 1989; 24(4): 10-11.

Roberts, Michael (EDUCOM). A Political Perspective on the Internet and NREN. *Computers in Libraries;* May 1992; 12(5): 58-61.

Note: In column titled "R&EN Transcripts."

Roberts, Michael M. (EDUCOM). Positioning the National Research and Education Network. *EDUCOM Review;* Summer 1991; 26(2): 11-13.

Roberts, Michael M. (EDUCOM). Testimony to the United States House of Representatives Committee on Science, Space and Technology Subcommittee on Science. *EDUCOM Review;* May/June 1992; 27(3): 14-17.

Roberts, Mike (EDUCOM). NREN Bill Signed into Law. *ConneXions;* February 15, 1992; 6(2): 16-18.

Robertson, Kathleen (University of Hawaii at Manoa). Astronomy Information: End Users in Action. Williams, Martha E., ed. *Proceedings of the Twelfth National Online Meeting, May 7-9, 1991, New York, NY.* Medford, New Jersey: Learned Information, Inc.; 1991: 315-320.

"Astronomy has captured the media attention with projects like Voyager and the Hubble Space Telescope. Yet, away from the public gaze, this discipline has been making giant strides in areas of database development and communication via electronic mail systems. As a highly computer literate group, astronomers have built and access as end-users, large bases of data and bibliographic information. The SIMBAD and NED databases are not available through the major vendors such as DIALOG. They [are] not known to many experienced online searchers. The unique object access capacities of these databases will be described. The role of the Internet and SPAN networks in communication and the electronic dissemination of astronomical research results will be discussed. The specialized databases and e-mail use in astronomy may well foreshadow future developments in other fields."

Robinson, Mike (Freelance writer and editor, Lexington, Massachusetts). Through a Lens Smartly. *BYTE;* May 1991; 16(5): 177-187.

Rockman, Ilene F. (California Polytechnic State University). Challenges in Teaching End Users Access to Internet Resources. Williams, Martha E., ed. *Proceeding of the Thirteenth National Online Meeting , May 5-7, 1992; New York, NY.* Medford, New Jersey: Learned Information, Inc.; 1992: 321-324.

"Teaching access to Internet resources continues to grow in importance, especially on higher education

campuses. The approach of offering a separate library course to undergraduates can have advantages over single workshop or seminar presentations. This paper will discuss factors which can contribute to the success of such a course."

Rockman, Ilene F. (California Polytechnic State University Library). Reference Uses of Campus Computer Networks: A Bibliographic Guide. *Reference Services Review;* Summer 1990; 18(2): 39-44.

Rogers, Michael. National Net'92: What Now with NREN? *Library Journal;* May 15, 1992; 117(9): 22.

Note: In column titled "Automation News."

Rogers, Susan M. (Rochester Institute of Technology). Educational Applications of the NREN. *EDUCOM Review*; Summer 1990; 25(2): 25-29.

Rosenbaum, Howard; Newby, Gregory B. (School of Information Studies, Syracuse University). An Emerging Form of Human Communication: Computer Networking. *ASIS '90: Proceedings of the 53rd Annual Meeting of the American Society for Information Science. Information in the Year 2000: From Research to Applications, November 4-8, 1990; Toronto, Canada.* Medford, New Jersey: Learned Information, Inc.; 1990; 27: 300-325.

"Computer networking is an emerging form of communication which is having major societal and cultural impacts. We first focus on BITNET and Internet, which are parts of a worldwide computer network for researchers, academicians, and information professionals. We discuss some of the services and resources that are available on the network, describe ways that these services can be accessed and used, and suggest several directions for research that we believe will be significant in understanding the impacts that computer mediated communication will have on social interaction, organizational structure and culture. Throughout, computer networking is treated as an emerging form of human communication. Next, there will be a discussion of directions in which research has been moving, and we will conclude with some suggestions for future research. This review of the research literature will demonstrate that, while there are certainly provocative findings, there is a need for a new research perspective to investigate CMC as an emerging form of communication. This perspective, informed by theories and methods from the social sciences, will attempt to understand the impacts of CMC by focusing on the perspectives and experiences of network users."

Ruhlin, Michele; Somers, Herb; Rowe, Judith (Rutgers University Library; Yale University Library; Princeton University). National Research and Education Network and the Federal Depository Library Program: A Position Paper for the American Library Association/Government Documents Round Table - Federal Documents Task Force. *DTTP Documents to the People;* June 1991; 19(2): 106-109.

Ryan, Joe (Syracuse University School of Information Studies). Resources for the New Network User. *Electronic Networking;* Fall 1991; 1(1): 40-48.

Note: Inaugural article in column titled "Resource Reviews."

Ryan, Joe; McClure, Charles R. (School of Information Studies, Syracuse University, Syracuse, New York). The Role of Public Libraries in the Use of the NREN. *OCLC Micro*; October 1991; 7(5): 31-33.

Sapon-White, Richard E. (Virginia Polytechnic Institute and State University). Cataloging Using Internet-Accessible Library Catalogs. *Technicalities;* October 1991; 11(10): 7-8.

The capability of logging on to remote library catalogs can be very helpful when additional information

(e.g., transliterations, key word assignment for older works) is not otherwise available for cataloging. Detailed instructions about how to log on and search are given and illustrative examples of successes and frustrations in remote catalog searching are recounted.

Saunders, Laverna M. The Virtual Library Today. *Library Administration & Management;* Spring 1992; 6(2): 66-70.

Note: Abstract from ERIC.

"Discusses the concept of a virtual library. Current systems are described, as well as pilot projects; administrative concerns are addressed, including cooperative collection development and networking; work of the Coalition for Networked Information (CNI) is discussed; and the National Research and Education Network (NREN) is described."

Scheid, Barbara L. Overview of NREN and CNI: How They Impact Your Library, Presented by Jane Ryland. *Information Technology and Libraries;* March 1992; 11(1): 43-44.

Schultz, Brad (Freelance writer, New York City). The Evolution of ARPANET. *Datamation;* August 1, 1988; 34(15): 71-74.

"ARPANET, the world's first packet switching network, has been a vital element in the nation's computer and communications research activities, but its managers determined that it was technologically obsolete. The ARPANET spirit lives on, however, in the networks it has spawned, now known as the Internet, which will supplant ARPANET for IS-critical research."

Schwartz, John. The Highway to the Future. *Newsweek;* January 13, 1992; CXIX(2): 56-57.

Schwartz, Michael F. [and others] (University of Colorado, Boulder). A Comparison of Internet Resource Discovery Approaches. Boulder, Colorado: University of Colorado; July, 1992; University of Colorado Technical Report CU-CS-601-92.

"In the past several years, the number and variety of resources available on the Internet have increased dramatically. With this increase, many new systems have been developed that allow users to search for and access these resources. As these systems begin to interconnect with one another through 'information gateways', the conceptual relationships between these systems come into question. Understanding these relationships is important, because they address the degree to which the systems can be made to interoperate seemlessly, without the need for users to learn the details of each system. In this paper we present a taxonomy of approaches to resource discovery. The taxonomy provides insight into the interrelated problems of organizing, browsing, and searching for information. Using this taxonomy, we compare a number of resource discovery systems, and examine several gateways between existing systems."

Schwartz, Michael F. (University of Colorado, Boulder, Colorado). Internet Resource Discovery at the University of Colorado; October 1992.

Note: This paper has been accepted for publication in *IEEE Computer Magazine*.

"Rapidly increasing global Internet connectivity offers tremendous opportunities for collaboration and information sharing. An important problem in this environment is how to discover resources of interest, such as documents, network services, and people. In this paper we discuss a number of aspects of the resource discovery problem, and summarize results from efforts to address these problems carried out in

the Networked Resource Discovery Project at the University of Colorado."

Schwartz, Michael F. (University of Colorado, Boulder, Dept. of Computer Science). *Resource Discovery in the Global Internet*. Boulder, Colorado: University of Colorado, Boulder; Department of Computer Science; 1991. 18 pp.

Note: Abstract from bibliographic record in WORLDCAT.

"Rapidly increasing wide area network interconnection promises vastly increased opportunities for remote collaboration and resource sharing. A fundamental problem that confronts users of such networks is how to discover the existence of resources of interest, such as documents, network services, and people. In this paper we overview efforts of the Networked Resource Discovery Project at the University of Colorado, Boulder, concerning resource discovery and a set of related problems."

Scott, Peter. HYTELNET as Software for Accessing the Internet: A Personal Perspective on the Development of HYTELNET. *Electronic Networking: Research, Applications and Policy;* Spring 1992; 2(1): 38-44.

Note: Abstract from ERIC.

"Describes HYTELNET, a hypertext utility which facilitates access to Internet resources for IBM-PC users. Software development and expansion of the utility from an electronic guide to online library catalogs to a complete directory of Internet sites are discussed. Instructions for retrieving HYTELNET are appended, and 14 references available through electronic mail are listed."

Seaborn, Margaret M. Senator proposes R&D network for high-powered researchers. (The High Performance Computing Act of 1991). *Government Computer News;* February 18, 1991; 10(4): 73.

Smarr, Larry L.; Catlett, Charles C. (National Center for Supercomputer Applications, University of Illinois at Urbana-Champaign). Life After Internet: Making Room for New Applications. *Information Technology Quarterly;* Summer 1991; 10(2): 12-21.

Dramatic changes in Internet transmission capability, up to a Gbit/s, are described, along with applications made possible by these improvements. Since 1980, the Internet has evolved from fewer than 50 dialup sites; 10,000 sites and 16 gigabyte memory are expected by 1993, with 4-dimensional visualizations that could require bursts of several hundred Mbit/s from only one user. Linked supercomputers and distributed metacomputers now permit simulations of global climatic change, albeit not in real time; an application for cancer surgery that requires data rates of 500 Mbit/s and produces visualizations in real time is under development in the VISTANET testbed. In the BLANCA testbed, astronomical observations gathered by radio telescopes are converted to visual images and displayed interactively, so that scientists can simulate moving through observed sections of outer space. As these and other projects that allow high-volume transmission progress, High Definition Television may be a component of the user interface. Software to help noncomputer scientists use these distributed environments; collaborative tools with intuitive object-oriented interfaces; and a standard user interface to facilitate searching through a variety of archives are all needed. A bimodal pattern of user needs seems to be emerging, with high-end, high Mbit/s users vastly outnumbered by the typical low-demand users who need only 2-dimensional visualization and email. A multitiered service is suggested, with fixed rates for low-end users and pay-per-use for high-volume data transmission. Predicting patterns of use and adding capacity for peak hours on a system of distributed metacomputers will prevent overloading; crucial to these predictions are clear descriptions of who network users are and what their needs are, although this information is not available currently.

Snowhill, Lucia; Meszaros, Rosemary (University of California, Santa Barbara). New Directions in Federal

Information Policy and Dissemination. *Microform Review;* Fall 1990; 19(4): 181-185.

Society for Industrial and Applied Mathematics (SIAM), Panel on Research Issues in Large-Scale Computational Science and Engineering. *A National Computing Initiative: The Agenda for Leadership*. Philadelphia, PA: Society for Industrial and Applied Mathematics; 1987.

Note: Report of the Panel on Research Issues in Large-Scale Computational Science and Engineering, SIAM Workshop held at Leesburg, Virginia, February 2-3, 1987. Sponsored by the National Science Foundation and the U.S. Department of Energy.

Soules, Aline (Kresge Business Administration Library, University of Michigan). Bill of Rights for an Electronic Society. *LITA Newsletter;* Fall 1991; 12(4): 15-17.

Note: Issue 46.

Sproull, Lee; Kiesler, Sara (Boston University School of Management; Carnegie Mellon University). Computers, Networks and Work. *Scientific American;* September 1991; 265(3): 116-123.

St. George, Art. A Voice for K-12 Networking. *Research & Education Networking*; January/February 1992; 3(1): 10-12.

St. George, Dr. Art; Larsen, Dr. Ron (University of New Mexico; University of Maryland). Internet-Accessible Library Catalogs & Databases. Robles, Carlos ed. Albuquerque, New Mexico: University of New Mexico; 1991.

Note: Available via e-mail from host LIST-SERV@UNMVM.BITNET; message GET LIBRARY PACKAGE; file size 281037 bytes.

Stahl, J. Natalia (Clarkson University, Potsdam, New York). Using the Internet to Access CARL and Other Electronic Information Systems. *Science & Technology Libraries;* Fall 1990; 11(1): 19-30.

"The existence of numerous interlocking local and national computer networks, collectively known as the Internet, presents an opportunity for academic and research libraries to offer their patrons access to a wide range of remote electronic information resources. The Colorado Alliance for Research Libraries (CARL) was one of the first to offer database access over the internet. Their Uncover database indexing current journal contents is a particularly useful source for small and medium sized academic libraries."

Stanton, Deidre E. (Murdoch University Library, Murdoch, W.A., Australia). Using Networked Information Resources: A Bibliography. Murdoch, W.A., Australia: Murdoch University Library; 1992.

Note: Available for anonymous ftp from host infolib.murdoch.edu.au, directory pub/bib; filename stanton bib; WordPerfect format in filename stanton.bib.wp.; file size 156464 bytes.

Stein, Richard Marlon (Software consultant and freelance writer, Van Nuys, California). Browsing Through Terabytes. *BYTE;* May 1991; 16(5): 159-164.

Steinberg, Don (Freelance writer, Boston, Massachusetts). Demon Knowbots. *PC/Computing;* January 1990; 3(1): 135-136.

Strangelove, Michael, Network Research Facilitator (University of Ottawa). Directory of Electronic Journals and Newsletters. 1 ed. 4-177 Goulburn Ave, Ottawa, Ontario, Canada K1N 8E3; July 1991

441495@Acadvm1.UOttawa.CA.

"This Directory is a compilation of entries for over 500 scholarly lists, about 30 journals, over 60 newsletters, and 15 "other" titles including some newsletter-digests."

Strangelove, Michael. University of Ottawa. *Directory of Electronic Journals and Newsletters.* University of Ottawa; July 1992.

Note: Edition 2.1 available for anonymous ftp from the LIBrary SOFTware archives at hydra.uwo.ca; filename EJOURNALS.TXT; file size 249659 bytes. Also available in low ascii text from the following location: CONTENTS PROJECT Listserv Fileserver. Send the following commands as an e-mail message to listserv@uottawa or listserv@acadvm1.uottawa.ca: GET EJOURNL1 DIRECTRY and GET EJOURNL2 DIRECTRY (note that there is no "A" in EJOURNL and no "O" in DIRECTRY). A hardcopy version of this directory is also available from: Office of Scientific & Academic Publishing, Association of Research Libraries, 1527 New Hampshire Avenue, NW, Washington, DC 20036.

Strangelove, Michael; Kovacs, Diane. *Directory of Electronic Journals, Newsletters and Academic Discussion Lists.* Okerson, Ann, ed. Washington, D.C.: Association of Research Libraries; March 1992; 241.

Note: Second Edition.

Sugnet, Chris (University of Arizona, Tucson, Arizona). Networking in Transition: Current and Future Issues. *Library Hi Tech;* 1988; 6(4): 101-119.

Note: Issue 24.

"When the initial library networks were established in the USA, they provided affordable, on-line automation services that were available from virtually no other source. The surge of automation experienced by US libraries for the past 2 decades has altered the historical relationships that characterise library cooperation. Local networks are being created and machine-readable products previously available only from the networks are now being packaged on optical media and distributed to individual institutions. With these technological advances, the need for, services offered by, and financial viability of the networks have begun to undergo dramatic change."

SURAnet Network Information Center (SURAnet Network Information Center, College Park, Maryland). Information Available on the Internet: A Guide to Selected Sources. Internet: SURAnet; May 18, 1992. 52 pp.

Note: Available for anonymous ftp from host ftp.sura.net, directory pub/nic; filename infoguide.10-12.txt, file size 118191 bytes.

"This Guide contains pointers to sources of information available on the Internet. The Guide consists of an Introduction and seven other Sections, each of which provides references to documents and other sources that deal with that topic. The source documents themselves are not provided."

Swisher, Robert [and others] (Ph.D. student in Education at Massey University, Palmerstown North, New Zealand). Telecommunications for School Library Media Centers. *School Library Media Quarterly;* Spring 1991; 19(3): 153-160.

Note: Brief (one paragraph) introduction by Michael B. Eisenberg.

"The focus of this article is on the uses of computer-based telecommunications and telefacsimile by school library media programs to provide information for management and services to users. The article is presented in four sections: section one discusses basic principles and uses of telecommunications technology; section two elaborates on various examples of uses such as network participation, information service, and management; section three presents a case study of telecommunications in Oklahoma, focusing on the application of technology for cooperative selection; and section four glimpses into the future, discussing the proposed National Research and Education Network (NREN) and the development of the Integrated Services Digital Network (ISDN)."

Tennant, Roy. *Crossing the Internet threshold: an instructional handbook.* Roy Tennant, John Ober, and Anne G. Lipow;Berkeley, California: Library Solutions Institute and Press; 1992.

Note: Foreword by Clifford A. Lynch ed.

Tennant, Roy (University of California-Berkeley). Network Basics. *Computers in Libraries;* April 1992; 12(4): 55-57.

Note: In column titled "R&EN Transcripts."

Tesler, Lawrence G. (Apple Computer, Inc.). Networked Computing in the 1990s. *Scientific American;* September 1991; 265(3): 86-93.

*Thinking robots, an aware internet, and cyberpunk librarians:* the 1992 LITA president's program: presentations by Hans Moravec, Bruce Sterling, and David Brin [et al.]. Miller, R. Bruce, Wolf, Milton T. , eds. Chicago, IL: Library and Information Technology Association; 1992.

Note: "A collection of background essays prepared for the 1992 LITA President's Program, Tools for Knowing, Environments for Growing: Visions of the potential of information technology for human development."

Tillman, Hope N.; Ladner, Sharyn J. (Babson College, Babson Park, MA; University of Miami, Coral Gables, Florida). Special Librarians and the INTERNET. *Special Libraries;* Spring 1992; 83(2): 127-131.

Usefulness of the Internet for libraries has advanced dramatically since 1990, as more large libraries are connecting their catalogs to permit remote searching. The authors conducted a two-tier survey, primarily via the network, about network use by special librarians. The survey found widespread, enthusiastic and productive use of remote login and search, file transfer, conferencing and e-mail, the authors enjoin special librarians to consider electronic networking a necessary tool of the information professional's trade.

Turock, Betty (Editor, "The Bottom Line"). NREN's Future: A Role for Libraries? *The Bottom Line;* Spring 1991; 5(1): 5.

U.S. Congress, Office of Technology Assessment. *Rural America at the Crossroads: Networking for the Future.* Washington, D.C.: U.S. Government Printing Office; April 1991.

U.S. Congress, Office of Technology Assessment. *High Performance Computing and Networking for Science--Background Paper.* Washington, DC: U.S. Government Printing Office; September 1989. 36 p.

U.S. Congress, Office of Technology Assessment. *SeekingSolutions: High-performance Computing forScience--Background Paper.* Washington, D.C.: United States Congress Office of Technology Assessment; April 1991. 38 p.

U.S. Congress, House of Representatives. Committee on Science, Space, and Technology. Subcommittee on Science. Management of NFSNET: Hearing before the Subcommittee on Science of the Committee on Science, Space, and Technology, U.S. House of Representatives, One Hundred Second Congress, second session, March 12, 1992. Washington, D.C.: U.S. Government Printing Office; 1992; 186 pages.

H.R. 5344 would amend the NSF Act of 1950 to permit the NSF to allow commercial traffic on the NSFNet, if that use increases the network's capability to support research and education. March 12, 1992: Testimony by Michael M. Roberts, Vice President, Networking, EDUCOM, Washington, DC: Douglas E. Van Houweling, Member Board of Directors, Merit Network, Inc., and Vice Provost for Information Technology, University of Michigan, Ann Arbor; Eric Hood, President, Federation of American Research Networks, Inc., Executive Director, Northwestnet, Bellevue, Washington; Mitchell Kapor, Chairman, Commercial Internet Exchange Association, and President, Electronic Frontier Foundation, Cambridge, Massachusetts; William L. Schrader, President and CEO, Performance Systems International, Inc., Reston, Virginia; A. Nico Habermann, Assistant Director, Directorate for Computer and Information Science and Engineering, NSF, Washington, DC; Stephen S. Wolff, Drector, Division of Networking and Communications Research and Infrastructure. June 4, 1992: Subcommittee markup of H.R. 5344; June 10, 1992: Full Committee markup. Appendix is a statement by E. Michael Staman, president, CICNet.

Van Houweling, Douglas E. (University of Michigan). A View from the Bridge. *EDUCOM Review;* March/April 1992; 27(2): 10-16.

Van Houweling, Douglas E. (The University of Michigan). The National Network. *EDUCOM Review;* Summer 1989; 24(2): 14-18.

Waldrop, M. Mitchell. Learning to Drink from a Fire Hose. *Science;* May 11, 1990; 248: 674-675.

Walsh, John. Designs on a National Research Network. *Science;* February 19, 1988; 239(4842): 861.

"Major upgrading of existing computer networks urged as part of strategy on high-performance computing."

Walsh, R. Taylor (Washington Information Services Corp.). High-speed networks. (government agencies and the computer industry are shaping the National Research and Education Network). *Government Computer News;* May 27, 1991; 10(11): 67(2).

"Government and industry have been collaborating on the development of high-speed data networks since the 1960s, when the Defense Advanced Research Projects Agency began creating the technology for the ARPAnet network. There are now plans to evolve the National Science Foundation's NSFnet into a more advanced network, the National Research and Education Network (NREN), while privatizing its funding. Federal and state budgets for research and education are declining, and the cost of privatized networking is unpredictable. Earth science researchers at the National Oceanic and Atmospheric Administration and United States Geological Survey hope for networked visualization of data because it would assist them greatly in their work. NREN's management and operational structures are not yet firmly decided upon, and many potential users are both uncertain and confused."

Wang, Chih (University of Guam Learning Resources). Electronic Information: Regulations, Laws, and TDF. Williams, Martha E., ed. *Proceedings of the Twelfth National Online Meeting, May 7-9, 1991, New York, NY.* Medford, New Jersey: Learned Information, Inc.; 1991: 423-431.

"This paper begins with an introduction to the recent development of information superhighways including

the National Research and Education Network (NREN) initiated by the U.S. government. It then highlights the issues of the U.S. federal regulations, intellectual property, and trans-border data flows (TDF) related to the new development. The paper discusses the problem of treating electronically "published" information by the Federal Communications Act and the concerns caused by the government deregulation. It raises the issues of applying authorship principles and copyright laws to computer generated information and points out the barriers of TDF due to economic concerns and national sovereignty and security."

Wanner, Gail (Dynix, Inc.). Using Internet: Benefits to a Corporation. Williams, Martha E., ed. *Proceedings of the Thirteenth National Online Meeting , May 5-7, 1992; New York, NY.* Medford, New Jersey: Learned Information, Inc.; 1992: 417-426.

Watkins, Beverly T. Humanities Scholars Seen as 'Pioneer' Users of Research and Education Network. The *Chronicle of Higher Education;* April 8, 1992: A22.

Watkins, Beverly T. New Group to Promote Internet's Role in Global Computer Networking. *The Chronicle of Higher Education;* September 11, 1991: A25.

Watkins, Beverly T. Proponents of High-Speed Network Urged to Stress Economic Benefits. *The Chronicle of Higher Education;* April 3, 1991; 37(29): A20.

Weber, Robert (Northeast Consulting Resources Inc., Boston, Massachusetts). Libraries Without Walls. *Publishers Weekly;* June 8, 1990; 237(23): S20-S22.

Weingarten, Fred (Computing Research Association). Five Steps to NREN Enlightenment. *EDUCOM Review;* Spring 1991; 26(1): 26-30.

Weiser, Mark (Computer Science Laboratory, Xerox Palo Alto Research Center). The Computer for the 21st Century. *Scientific American;* September 1991; 265(3): 94-104.

"Specialized elements of hardware and software, connected by wires, radio waves and infrared, will be so ubiquitous that no one will notice their presence."

Welsch, Erwin K. Accessing Information through Networks. *OCLC Micro;* February 1991; 7(1): 26-28.

Note: In column titled "A Closer Look at...."

West, Richard P.; Katz, Richard N. (University of California; University of California). Implementing the Vision: A Framework and Agenda for Investing in Academic Computing. *EDUCOM Review;* Winter 1990: 32-37.

"This article represents Vision Statement #3 of the Coalition for Networked Information."

West, Richard; Katz, Richard (Information Systems and Administrative Services). NREN and CALREN: National and Regional Networks to Promote Research. *DLA Bulletin;* Spring 1990; 10(1): 16.

Note: Issue No. 22.

"Remote use of libraries--by individuals as well as other libraries--is increasing as resource sharing becomes more important. Networks make these connections possible. This article discusses recent developments in the effort to develop national and regional networks to promote education and research. It is adapted from two articles that appeared previously in Protocol: "Governance Options for the Development of a California Backbone Network" (July 1989) and "Federal Government Moving Towards

High Speed Network" (December 1989)."

Williams, Brian (Multnomah County Library, Portland, Oregon). Libraries, Listservs, and LITA. *Computers in Libraries;* May 1992; 12(5): 45-57.

Note: In column titled "R&EN Transcripts."

Williams, Frederick; Brackenridge, Eloise. Transfer via Telecommunications: Networking Scientists and Industry. *Technology transfer: a communication perspective*. Newbury Park, California: Sage Publications; 1990; 172-191.

"Dating from the 1960s, when scientists first gained remote access via telecommunications networks to mainframe computers to share programs, files, or leave messages for one another, we have seen the evolution of networks for resource sharing and communications. Such network services are playing an increasingly important role in technology transfer, not only in supporting collaboration among scientists and giving them access to a wide variety of computing and data base resources, but also in linking them to government and commercial groups charged with bringing technology to the marketplace. In this chapter the authors review examples of such networks and services, then conclude with a view toward priorities for further development. Frederick Williams, whose background was summarized in the introductory chapter of this volume, is Director of the Center for Research on Communication Technology and Society at the University of Texas at Austin. Eloise Brackenridge, at the time of this writing, was completing a doctorate at that institution. Her background includes executive positions in communications, planning, and marketing with large multinational corporations. Earlier in her career she served overseas with the U.S. Department of State's Foreign Service."

Wilson, David L. Debates on Access, Expense, and Management Rage Over Development of High-Speed Computer Network. *The Chronicle of Higher Education;* April 15, 1992; 38(32): A21, A24-25.

Intense and wide-ranging debates surrounding the evolution of the Internet/NREN focus on federal vs private management and support of the network infrastructure, the time frame for achieving wide public access, and the cost of access. Currently, most investment is $30 private for every $1 of public funds. Public funding is via nine federal agencies led by National Science Foundation, but these diverse agency programs are not necessarily congruent with the swift development of an NREN that will be easily accessible by most citizens.

Wilson, David L. Gigabits Aside, People Can't Seem to Agree on Best Use of Planned High-Speed Network. The *Chronicle of Higher Education;* April 15, 1992; 38(32): A25.

Differences in visions of the NREN are highlighted. Currently the Internet can transmit 45 megabits (about 50 pages per second); by 1996 the NSFnet backbone will transmit a gigabit (30,000 pages per second); speed of transmission, however, will be limited by the carrying capacity of shorter-distance connecting networks.

Wilson, David L. High Cost Could Deny Big Computer Advance to Some Colleges. *The Chronicle of Higher Education;* December 4, 1991; 38(15): 1, 32.

Wilson, David. High-Speed Network for Research Stirs Controversy. *The Chronicle of Higher Education;* March 4, 1992: 38(26): A22, A24.

Note: In column titled "Information Technology."

Wilson, David L. Host of New College Services Could Follow Plan to Allow TV Signals on Phone Lines. *The Chronicle of Higher Education;* July 29, 1992; 38(47): A13-A14.

Note: In column titled "Information Technology."

Wilson, David L. Huge Computer Network Quickens Pace of Academic Exchange and Collaboration. *The Chronicle of Higher Education;* September 30, 1992: 39(6): A17-A19.

Wintsch, Susan (Freelance science writer). Toward a National Research and Education Network. *MOSAIC;* Winter 1989; 20(4): 32-42.

"Before a National Research and Education Network permits researchers to collaborate across the continent as easily as they now can across a laboratory, a troublesome array of problems will have to be solved. Exploitation of optical bandwidths, switching at unprecedented speeds, and a tangle of software problems top the list. Target dates and timetables for meeting those challenges are being set today."

Witherspoon, John P. (Department of Telecommunications and Film, San Diego State University, San Diego, California). Planning Models for National Research and Education Network Development. *EDUCOM Review;* Summer 1991; 26(2): 20-24.

Wittie, Larry D. (State University of New York at Stony Brook). Computer Networks and Distributed Systems. *Computer*; September 1991; 24(9): 67-76.

"This article examines current trends in computer networks and distributed systems and predicts the major ramifications of these trends during the next decade."

Wobus, John M. (Computing & Network Services, Syracuse University). Syracuse University Network Bibliography. Syracuse, New York: Syracuse University Computing & Network Services; June 13, 1990; NETBIB-4.

Note: Available via anonymous ftp from host icarus.cns.syr.edu, directory: info; filename: netbib.txt; file size 23494 bytes.

"This is a bibliography of publications on various kinds of networking. It is intended for use at Syracuse University and includes publications specific to Syracuse University as well as publications of more general interest.

Wright, Karen. The Road to the Global Village. *Scientific American;* March 1990; 262(3): 83-94.

Wulf, William A. (National Science Foundation). Government's Role in the National Network. *EDUCOM Review;* Summer 1989; 24(2): 22-26.

Yanoff, Scott. Special Internet Connections; 6/30/92.

Note: Available for anonymous ftp from host csd4.csd.uwm.edu, directory pub; filename inet-services, file size 18151 bytes.

As of June 30, 1992, this alphabetic list of Internet resources included 80 Internet addresses and noted specific offerings at each one. The list is updated weekly; new entries are tagged.

Zillner, Tom. NREN: Now What? *NewTech News;* January 1992: 1-3.

The High Performance Computing Act was signed into law by President Bush Dec. 9, 1991 as PL102-194, having passed the House November 20 and the Senate November 22, 1991. Section 102(c)(6) language leaves room for metered chargeback for NREN usage. Advanced Network and Services (ANS), a nonprofit, has formed a for-profit subsidiary, ANS CO+RE, to sell computer network services. John Markoff in The New York Times and Joe Abernathy in the Houston Chronicle have reported the intense debate on unfair advantage in NSF support for ANS and its for-profit subsidiary, ANS CO+RE; David Farber of the University of Pennsylvania sees the current situation as basically unfair, as does Mitch Kapor of the Electronic Freedom Foundation. PL102-194 Sec. 101(a)(2)(H), Sec. 101(b), Sec. 102(b), and Sec. 206(a) specify NREN roles for libraries. No language assures NREN use for K-12 students, or any students, or the general public: wide access is likely to be achieved only by intense lobbying.